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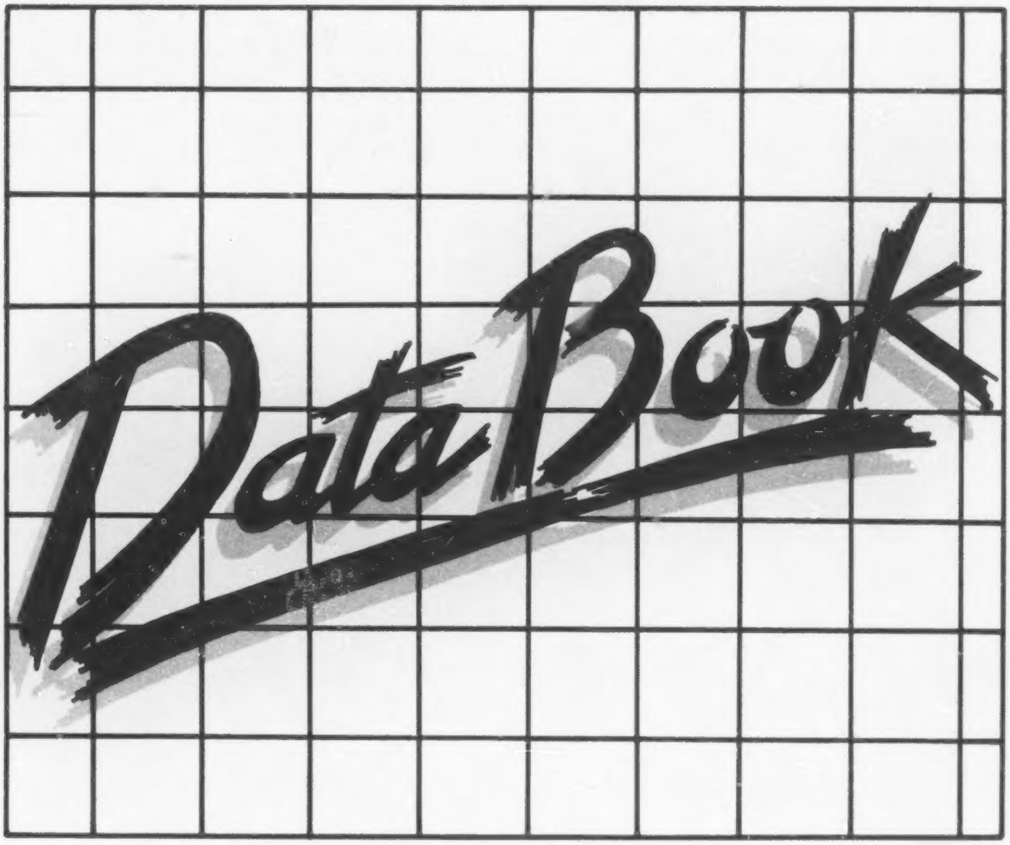

Data Book

1988 Edition

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Oil & Gas Journal DataBook

1988 Edition

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Foreword

If 1986 is etched in history as the "Year of the Crash" in oil prices, 1987 will be remembered as the "Year of the Meltdown" in the stock market.

Analysts exhausted their vocabularies searching for the most apt appellations for Black Monday, October 19, the day the Dow Jones industrial average lost 500 points and a trillion dollars in value and investors relearned the rude and expensive lesson of the oil markets of five years earlier.

An act of levitation can be performed for only so long. Whether for common stocks or oil, prices will not permanently defy the laws of economic gravity.

But the stock market crash will not leave a trace in the statistics appearing in this *Oil & Gas Journal DataBook*. That story of its impact, unknown at the end of 1987, will unfold in a future edition.

This edition mirrors the ripples from the oil price crash of '86 and the recovery that began in '87. Most of the story is told in macro terms, in the weekly and monthly statistical series that quantify the trends in activity, supply, and demand. Those macro trends are but the sum of individual actions and results by single entities which in the aggregate comprise the industry.

As the OGJ 400 shows, the industry as such doesn't do anything. It is individual companies and entrepreneurs who examine the market environment, then arrive at independent decisions to drill, to produce, to build and operate plants. And it is individual units that make profits or losses. The total of their separate performances paints a broad picture of the industry, its health, and its direction. The broad brush, in unstable times, conceals almost as much as it reveals.

For example, the OGJ 400 as a group had net income of $5.2 billion in 1986, down 68.5% from the previous year. Thus, one might conclude, it was a profitable year for the 400 companies, though not nearly as profitable as 1985.

Look again. It was a profitable year for less than one-third of the 400. Most were in the red, more than twice as many as in the previous year. And, of those in the black, fortunes varied wildly.

Here, analysis need not go beyond a comparison of the rest of the pack with Exxon Corp., No. 1 by most yardsticks, and certainly tops in net income. Exxon turned in profits of $5.36 billion. That's more than the combined earnings of the other 399, which had a net loss of $150 million.

How could that be?

The explanation highlights the wisdom—for the moment, at least—of integration. When conditions turn sour in one end of the business, it's nice to have a hedge in another.

Thus, with the collapse in crude prices, Exxon, like other producers, suffered huge declines in revenues and profits from production. For some, this normally lucrative side of the business was no better than breakeven; for others, for the first time in their history, it was a losing proposition.

But for integrated companies, whose downstream is often squeezed in years of greatest upstream prosperity, the story didn't end there. Many enjoyed one of the most profitable years ever in refining, marketing, and petrochemicals. Raw material costs fell faster than prices for finished products. So for Exxon and a few others similar situated it was possible for a crash in crude prices to produce a banner year in other operations in which lower prices meant a massive reduction in costs.

Manufacturing is a business of margins, and 1986 margins were much improved. In normal times the downstream sector plays second fiddle to exploration and production, where historically most of the profit has been taken. Hence, for refining and marketing, prosperity usually is associated not with stability but with unusual events. The Arab embargo of 1973–74 was such an event, nullifying the effect of surplus productive and refining capacity. So was OPEC's drive to recapture market share in 1986.

Unfortunately, there is another side to that coin, and that is reflected in earnings reports for 1987. The next OGJ 400 will show improved results for exploration and production, but slimmer margins downstream. In other words, back to normal. Chemical profits remain strong.

Most of the charts and tables in this *DataBook* trace the consequences of the events of 1986, and the price recovery that followed.

The increased demand that began with sharply lower prices continued even after the turnaround in prices. Oil is for the moment still a growth industry, but producers realize there are limits to growth at prices above current levels. Natural gas, a regulated industry which is institutionally unable to compete in a rapidly changing market, lost customers to oil in a big way in 1986. But as oil prices recovered in 1987, natural gas recouped part of its losses. And its price edge will continue to be felt in interfuel competition so long as the gas bubble lasts, which won't be long, if the predicted severe winter comes to pass.

Just as demand is price elastic, supply is, too. The decline in U.S. production persisted, dropping yearend 1987 output a million barrels per day below the early 1986 monthly peak. But for new production in Alaska and California, the decline would have been even greater. The trend will continue through 1988. Indeed, there is no turnaround in sight.

Higher prices brought a modest recovery in drilling in the second half of 1987. Barring another setback in prices, that recovery should continue through 1988. But it will likely be years before drilling returns to even 1985 levels, the minimum required to reverse the production decline. For drilling to recover to that degree—more than double the 1986–87 rate—one of two things must happen.

Market conditions must change substantially, either through action of OPEC or the U.S. government, or the government must offer tax or other incentives that it has been unwilling to grant so far. At the start of 1988, neither is in prospect in the foreseeable future.

That means a continued rise in imports, which spells problems for policymakers, and changes in oil company supply patterns.

It also means a continuation of the trend toward investments by American companies outside the United States, triggering a replay of the 1960s. During the boom years of 1974-81, the U.S. captured the lion's share of world drilling investment. U.S. finding costs were high, but prices were high enough to make margins attractive. Finding costs were much lower in geologically more favorable areas outside the U.S., but high royalty and taxes eroded most of the margins.

At sharply lower prices, U.S. margins are squeezed once more, as they were in the '60s. Most other countries have cut fiscal costs, retaining margins for operators who see much greater opportunity for large discoveries abroad than in the U.S.

Until something changes to shift this balance, capital will continue to flow outside the U.S. That doesn't necessarily mean a lower rig count in the U.S.—just a smaller share of international petroleum investment, and continued shrinkage of the American industry upstream. Barring an unexpected decline in prices, the 1988 outlook is for modest expansion of drilling in the U.S. and internationally as well.

In this period of shifting opportunities—of some recovery in the U.S., but possibly greater exploration rewards abroad, and continued modest growth in demand worldwide if the stock market crash doesn't bring recession—analysts will be challenged to sort out the opportunities from the false leads that abound.

The figures in this *DataBook* offer some raw clues. They represent the beginning of analysis and not the end.

The past year has been one of challenge for those of us who make these compilations and try to derive something coherent from the sometimes seemingly contradictory numbers. Readers occasionally remind us of the three categories of falsehoods—lies, damn lies, and statistics. Some in frustration would omit statistics from this set on grounds it gives lies a bad name.

They react in frustration to the sharp revisions in figures from official sources, to the seeming gaps between what the supply/demand statistics say and what the the real world in the market is saying.

They forget for the moment that statistics are, after all, estimates. Absolute precision, though greatly to be desired, is a target to be pursued rather than a routine achievement.

Consider production. Do not states and nations know exactly how much they produce each month? Well, some have a better data collection system than others, and some are more concerned with promptness and accuracy than others. Also, the statistician must contend with varying definitions of crude oil production. Some countries include condensate; others don't. Occasionally, government agencies, including the U.S. Department of Energy (DOE), change the definition of a key term. Occasionally, official sources make sharp revisions in data, as DOE did last year with U.S. crude oil production, confounding compilers of statistics and analysts who use their figures month-to-month.

Supply is made up of production and stocks, plus the enormous volumes that are in transit and so not available for consumption. Production in the Middle East may not show up in stocks of a consuming country for a couple of months.

Consumption, too, is difficult to measure. Its surrogate, demand, is usually derived not from information about consumption by end users, which for a product as ubiquitous as petroleum is impossible, but rather by the disappearance of supply.

Of all petroleum statistics, proved reserves is perhaps the most mercurial. In contrast to other petroleum statistics, which at least deal with volumes of oil and gas that have been produced, this category refers to petroleum that is expected to be produced as fields are depleted over their useful lives.

In addition to this predictive dimension, the compilation of reserves is fraught with other problems. Private companies may consider the figures proprietary. Because governments are the main reporters of reserves internationally, politics may become a factor in deciding on the size of reserves and whether to disclose figures publicly.

Thus, in making worldwide estimates for reserves at the end of 1987, *Oil & Gas Journal* was confronted with new official figures for some of the major exporting nations. These revisions of earlier reports from Venezuela, Iran, Iraq, Kuwait, and Abu Dhabi resulted in a sharp increase, around 26%, in total estimated proved oil reserves in the non-Communist world.

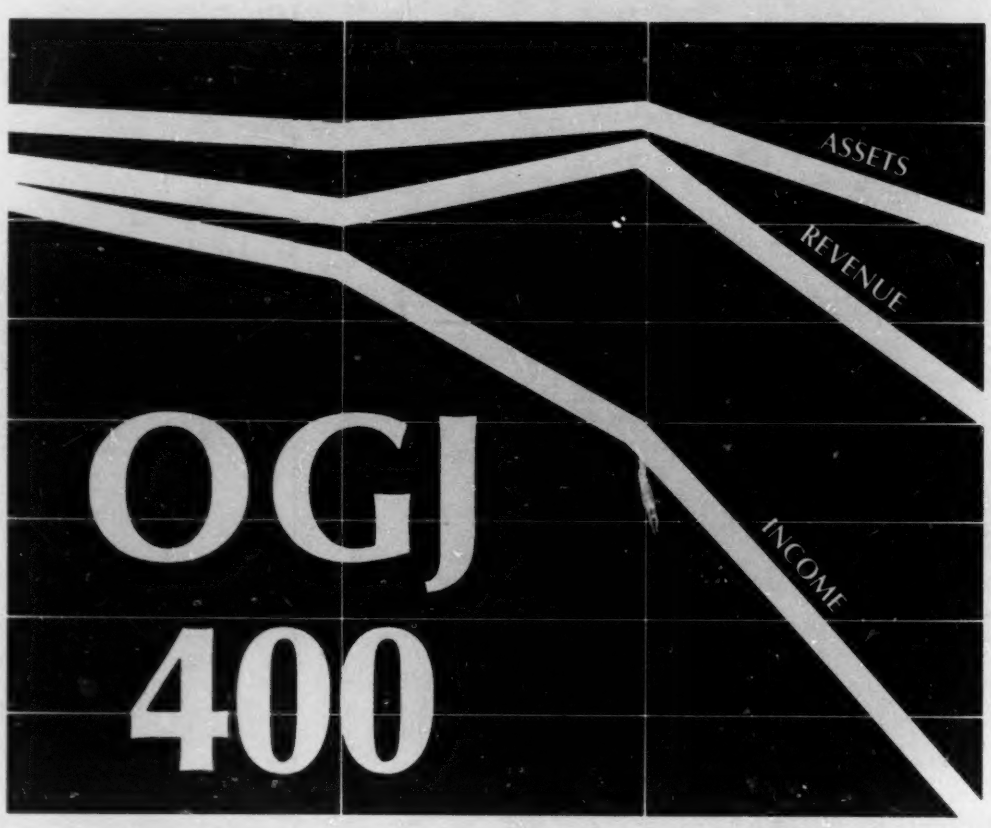
Does that mean that in a recession year for exploration these countries discovered additional scores of billions of barrels of oil? No, the higher figures are the product of new appraisals of the results of exploration, development, and enhanced recovery over the past several years. Thus, strictly speaking, reserves were not increased by anywhere near that amount during 1987. As a matter of fact, there was probably very little year-to-year change in proved reserves. Considering discoveries alone, the non-Communist world as a whole almost certainly failed to replace the oil produced in 1987.

It is equally certain that the general picture painted by these figures is correct. Reserves in the rest of the world are declining. OPEC's share of total reserves is even greater than before—82% of the non-Communist total, by the current reckoning. Whether the precise amount is 75%, 80%, or some other figure, is unimportant; the proportion is about right. That means that regional production trends will increasingly reflect reserves. There is almost no spare productive capacity outside OPEC. Therefore, most production increases, beginning almost immediately, must come from members of that group. As time passes, development opportunities and markets for equipment and services will be more closely related to reserves.

This is the kind of intelligence that comes from a study of reserves and other statistics. These and other series are compiled in the *DataBook* for analysts who must try to sort out the meaning of such trends and make business decisions based upon them.

Gene T. Kinney, Editor
Oil & Gas Journal

OGJ REPORT



Fiscal 1986 returns for OGJ400 petroleum companies reflect tough upstream year

Glenda Smith
Statistics Editor

Slightly more than one fourth of the top 400 public U.S. oil and gas companies made a profit in 1986. It was the toughest year in memory for many firms, especially those non-integrated companies that depend on exploration success and revenues from oil and gas sales for their livelihood. And well into 1987, the problems persisted.

Many companies wanted only to survive; they were willing to forego profit for a year or two.

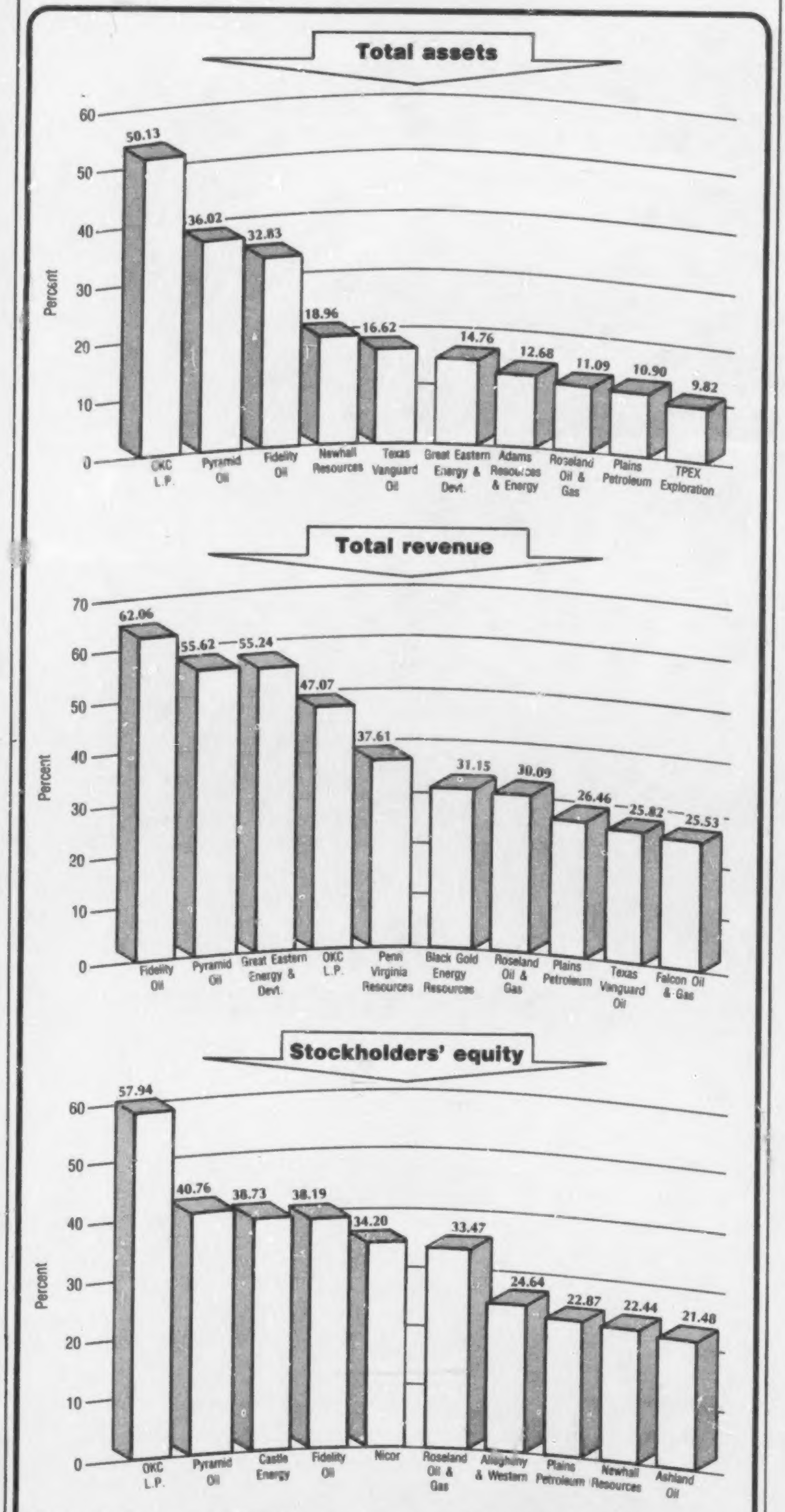
And most did survive, as this fifth edition of the OGJ400 reflects. A few did much more than survive.

More than two months into the second half of 1987, the best news is that confidence is returning. The Middle East's huge excess producing capacity makes crude price stability still tenuous. Companies are still wary of starting big exploration and development projects, especially with their shrunken capital.

And no one expects crude prices to climb much faster than inflation during the next few years from today's $18-20/bbl level.

Tables in this reprint based on corrected data.

Top companies in return on...*



*Includes subsidiary companies, whose accounting methods vary and who may be helped by contributions from parent companies. Excludes companies whose results were inflated by identifiable extraordinary gains. Excludes royalty trusts. Excludes companies who get only a small portion of their total revenues from oil and gas.

OGJ

Still, with costs slashed and new organizations shaped, many companies appear ready to take advantage of the expected modest recovery. But the recovery will be mixed as higher crude oil prices squeeze refining margins and weak gas markets continue to depress results in this sector.

For about two-thirds of the OGJ400 companies, the fiscal year coincides with the calendar year. But different fiscal periods make it necessary to use care in comparing one company's performance with that of another on a year-to-year basis.

On the whole, performance of the OGJ400 companies slipped again in 1986, though some always buck the trend. Indeed, this fifth OGJ400 report is the fifth decline in two key indicators for the group, total revenue and net income. Total net income for the 400 companies was down steeply over the 5 years, almost 83%.

This year, the No. 1 company, Exxon, had a net income of $5.36 billion, but the other 399 companies turned in a combined net loss of over $150 million. Not all had losses, but the losses more than offset the gains.

Of the 400, 116 companies were able to show a profit for 1986, compared with 196 companies in 1985. In 1982, 265 companies on the OGJ400 list had a profit for the year.

Total revenue did not drop as precipitously as income in 1986, but did fall 26% to $422 billion.

Not only did lower prices for oil and gas reduce revenues and profits, but many companies also were forced to write-down the value of their properties.

Here are some other highlights of this year's OGJ400 compilation:

- Total assets of the group dropped 8.6% to about $495 billion, after a marginal increase last year over 1984.
- Net income for the 400 firms was down 68.5% in fiscal 1986 compared with 1985. It has fallen from about $30 billion for fiscal 1982 to $5.2 billion last year.
- Capital and exploratory spending by the top 400 U.S. companies fell by one-third, to only $44 billion. And the 20 largest companies did 80% of that spending.
- The only gains made by the group were in gas reserves and gas production. Liquids reserves positions held by the group worsened slightly both in the U.S. and elsewhere. And the group's liquids production declined.

A changing roster. Industry trends over the past five years are apparent in the performance of the OGJ400. But the same companies are not included each year, so year-to-year comparisons cannot be made on an identical basis.

The top 20 in total revenue

Rank	Company name	Total revenue, $ million
1	Exxon Corp.	76,555.0
2	Mobil Corp.	49,865.0
3	Texaco Inc.	32,591.0
4	Chevron Corp.	27,131.0
5	Amoco Corp.	20,231.0
6	Shell Oil Co.	17,353.0
7	Occidental Petroleum Corp.	16,028.5
8	ARCO (Atlantic Richfield Corp.)	15,774.0
9	Tenneco Inc.	14,617.0
10	Conoco Inc.	11,039.0
11	Sun Co.	10,440.0
12	Standard Oil Co.	10,115.0
13	Phillips Petroleum Co.	10,015.0
14	USX Corp. (Oil & Gas Segment)	8,963.0
15	Unocal Corp.	8,253.0
16	Enron Corp.	7,562.0
17	Ashland Oil Co.	7,373.9
18	Coastal Corp.	6,718.1
19	Texas Eastern Corp.	4,103.2
20	Amerada Hess Corp.	4,062.3
	Total	**358,790.0**

Some key changes from 1986 OGJ400*

How company appeared on last year's list	Why change?	How company appears on this year's list
Aztec Resources	Merged into	Wepco Energy
Cambridge Royalty	Merged into	Global Natural Resources
Champlin Petroleum	Name changed to	Union Pacific Resources
Depco	Now listed as	DeKalb Energy
Deca Energy	Merged into	K.R.M. Petroleum
Drillers	Name changed to	DI Industries
General Hydrocarbons	Sold oil & gas assets to	Montana Power
High Plains Oil	Merged into	Adobe Resources
Houston Oil Fields	Merged into	Plains Resources
Inexco Oil	Merged into	Louisiana Land & Exploration
MDU Resources Group	Now listed under subsidiary	Fidelity Oil
Marathon Oil	Now listed as	USX (Oil & Gas Segment)
MidCon	Merged into	Occidental Petroleum
Minden Oil & Gas	Merged into	Castle Energy
Mustang Drilling & Expl.	Name changed to	Mustang Companies
Newport Petroleums	Merged into	Mineral Development
Nova Petroleum	Merged with Power Resources to form	Nova Natural Resources
Pacific Lighting	Now listed under subsidiary	Pacific Lighting Oil & Gas
Panhandle Eastern	Spun off oil & gas to form	Anadarko Petroleum
Petra Resources	Merged into	Zim Energy
Petro-Lewis	Name changed to	FPCO Oil & Gas
Pioneer	Merged into	Mesa Limited Partnership
Ridgeway Exco	Merged into	Taurus Petroleum
Southland Royalty	Merged into	Meridian Oil
States Exploration	Merged into	Wepco Energy
Templeton Energy	Name changed to	TGX Corp.
Texas Gas Exploration	Now listed as	CSX Oil & Gas
Texas Oil & Gas	Now listed with Marathon as	USX (Oil & Gas Segment)
UGI	Sold oil & gas assets to	Consolidated Natural Gas
Unit Drilling & Expl.	Name changed to	Unit Corp.
Wicor	Now listed under subsidiary	Wexco of Delaware
Worldwide Energy	Merged into	Triton Energy

The following companies sold all of their U.S. oil and gas assets during 1986 to private companies, companies not included in the OGJ400, or to companies which were not identified:

Bow Valley Petroleum
Cayman Resources
Crown Zellerbach
IMC Exploration
Kanai
Lear Petroleum
Mapco
Tricentrol plc
U.S. Minerals Exploration
Williams Cos.

* In addition to the above changes, four companies are no longer publicly traded, five companies were liquidated, and others have no financial data available or can not be located.

For instance, 65 new companies were needed to round out the OGJ400 this year. Ten of these were limited partnerships; eight of the ten are owned by another company on the list. Of the other new companies, several are returning to the list after an absence of a year or two, a number are subsidiaries of other companies, and a few are newly-organized firms. Anadarko Petroleum and Noble Drilling were spun off from their parent companies during 1986.

Mergers continued to reduce the number of companies in the industry last year. And at least five compnies on the 1985 list have been liquidated. At least 13 companies sold or spun off all of their oil and gas producing assets during fiscal 1986. Most were not leaving the industry, just redirecting their efforts.

Changes in what it takes to make the top 400 companies list reflect what has happened to the industry in the past 5 years. For the first edition of the OGJ400, which was based on 1982 fiscal data, assets of more than $550 million were required to make the top 100. This year, to reach the top 100 list only required assets of $237 million.

For fiscal 1986, only 136 companies had assets of $100 million or more, compared with 175 companies in fiscal 1983.

Of course, most companies on the OGJ 400 list change in ranking each

Fastest growing companies*

Rank by total assets	Company	Stockholders' equity 1986 ($1,000)	Stockholders' equity 1985 ($1,000)	% change	Net income 1986 ($1,000)	Net income 1985 ($1,000)	% change	Long-term debt 1986 ($1,000)	Long-term debt 1985 ($1,000)
104	Allegheny & Western Energy Corp.	67,934	33,440	103.2	16,740	12,491	34.0	49,054	56,600
148	Exploration Co. of Louisiana	52,198	34,616	50.8	314	192	63.5	16,472	4,600
310	Roseland Oil & Gas Inc.	1,183	829	42.7	396	331	19.6	0	0
34	Nicor Inc.	535,542	378,654	41.4	183,146	152,059	20.4	478,490	526,184
67	Yankee Cos.	32,599	23,611	38.1	2,970	2,510	18.3	24,800	27,025
70	Quaker State Corp.	390,661	311,864	25.3	50,288	45,892	9.6	64,370	112,062
222	Swift Energy Co.	6,617	5,402	22.5	1,108	778	42.4	0	23
150	Pauley Petroleum Inc.	27,775	22,735	22.2	5,004	2,082	140.3	12,778	24,703
287	Black Gold Energy Resources Inc.	2,355	1,970	19.5	385	312	23.4	1,466	439
243	Energy Assets International Corp.	4,604	3,881	18.6	688	643	7.0	1,550	2,450
351	Pioneer Oil & Gas Corp.	1,270	1,151	10.3	118	115	2.6	21	0
111	Hadson Corp.	40,717	36,906	10.3	4,908	4,487	9.4	63,055	16,100
1	Exxon Corp.	32,012,000	29,096,000	10.0	5,360,000	4,870,000	10.1	4,294,000	4,820,000
2	Mobil Corp.	15,239,000	14,089,000	8.2	1,407,000	1,040,000	35.3	7,885,000	9,328,000
129	Global Natural Resources Inc.	93,184	87,352	6.7	4,063	2,095	93.9	5,486	5,198
46	Primark Corp.	473,949	445,892	6.3	53,797	51,244	5.0	267,412	289,027
23	Ashland Oil Inc.	971,044	929,411	4.5	208,571	146,722	42.2	1,098,691	884,661

* Companies were selected on the basis of growth in stockholders' equity. Only companies with positive net income for both 1985 and 1986 were considered. Companies were not considered if they had a decline in net income for 1986, were subsidiaries of another company, or became public within the last year.

The top 20 in net income and in stockholders' equity

Rank	Company	Net income, $ million
1	Exxon Corp.	5,360.0
2	Mobil Corp.	1,407.0
3	Shell Oil Co.	883.0
4	Amoco Corp.	747.0
5	Texaco Inc.	725.0
6	Chevron Corp.	715.0
7	ARCO (Atlantic Richfield Corp.)	615.0
8	Sun Co.	385.0
9	Conoco Inc.	355.0
10	Phillips Petroleum Co.	228.0
11	Ashland Oil Inc.	208.6
12	Nicor Inc.	183.1
13	Occidental Petroleum Corp.	181.1
14	Union Exploration Partners Ltd.	176.4
15	Unocal Corp.	176.0
16	Consolidated Natural Gas Co.	174.7
17	American Royalty Trust	97.8
18	Columbia Gas System Inc.	86.8
19	Montana Power Co.	86.5
20	Coastal Corp.	71.6
	Total	**12,862.6**

Rank	Company	Stockholders' equity, $ million
1	Exxon Corp.	32,012.0
2	Chevron Corp.	15,493.0
3	Mobil Corp.	15,239.0
4	Shell Oil Co.	14,312.0
5	Texaco Inc.	13,739.0
6	Amoco Corp.	11,324.0
7	Standard Oil Co.	7,020.0
8	Sun Co.	5,287.0
9	ARCO (Atlantic Richfield Corp.)	5,259.0
10	Tenneco Inc.	4,412.0
11	Occidental Petroleum Corp.	4,308.3
12	Amerada Hess Corp.	2,050.5
13	Phillips Petroleum Co.	1,724.0
14	Unocal Corp.	1,681.0
15	Consolidated Natural Gas Co.	1,582.9
16	Columbia Gas System Inc.	1,498.6
17	Diamond Shamrock Corp.	1,395.8
18	Meridian Oil Inc.	1,375.8
19	Kerr-McGee Corp.	1,338.0
20	Mesa Limited Partnership	1,303.4
	Total	**142,355.5**

year; only 13 companies on this year's list are in the same position they held last year. Six companies moved up by more than 50 slots, many as a result of merger or acquisition; others, as subsidiaries, moved up because their parent company was able to help. And some gained position merely by holding steady while others slipped behind.

Belcor moved up 113 spots to No. 253 because of diversification. It kept its oil and gas operations, but acquired non-energy businesses and is redirecting efforts away from oil and gas.

Enex Resources, up 109 spots to No. 188, acquired the producing properties of BTU Operating Co., which contributed to its $26.5 million increase in assets. During 1986, Harken Oil & Gas, which moved up 88 places to No. 121, purchased Spectrum 7 Energy Corp., Kennedy & Mitchell Inc., and E-Z Serve, an operator of retail gasoline outlets.

A number of companies that lost position on the list did so because they had to write down the value of oil and gas properties. Wichita Industries, for example, fell 110 places to No. 334, in part due to a $5.5 million write down. The company also sold certain oil and gas properties to Fountain Oil & Gas for cash. Seaxe Energy wrote down producing properties by $9.9 million and fell 77 places to No. 331.

J.M. Resources, which dropped 97 slots to No. 378, turned over many of its producing properties to its secondary lenders to satisfy debt.

The group's performance. Total worldwide revenues for the 400 companies in the OGJ group came to $422.3 billion in 1986, equal to 10.04% of U.S. gross national product (GNP). The group's share of GNP in 1985 was 14.3% and in 1984 amounted to 15.9%.

Only three of the 14 performance yardsticks increased in 1986 compared with the previous year. Worldwide gas reserves, as well as U.S. gas reserves increased slightly, and U.S. gas production by the group was up 5.4%

But compared with 1985, all financial results for the group declined in 1986. Total assets were down 8.6%; total revenue, down 26.2%; net income, down 68.5%; and stockholders equity was down 4.6%. Capital and exploratory spending dropped 33.3% and net wells drilled in the U.S. fell by 42.4%.

With net income falling sharply, it is no surprise that financial ratios fell, too. Return on assets was only 1.05% in 1986 compared with 3.04% the previous year. Return on revenue was 1.23%, down from 2.88% in 1985. Return on equity fell to just 2.99% in 1986, compared with 9.06% the year before.

The top 20 in spending and U.S. net wells drilled

Rank	Company	Capital exploratory spending, $ million
1	Exxon Corp.	7,200.0
2	Amoco Corp.	3,181.0
3	Mobil Corp.	3,046.0
4	Chevron Corp.	3,018.0
5	Shell Oil Co.	2,842.0
6	Texaco Inc.	2,369.0
7	ARCO (Atlantic Richfield Corp.)	1,822.0
8	Standard Oil Co.	1,618.0
9	Conoco Inc.	1,410.0
10	Tenneco Inc.	1,188.0
11	Sun Co.	1,087.0
12	USX Corp. (Oil & Gas Segment)	1,022.0
13	Occidental Petroleum Corp.	979.4
14	Unocal Corp.	862.0
15	Freeport-McMoRan Inc.	763.4
16	Celeron Corp.	737.1
17	Phillips Petroleum Co.	655.0
18	Texas Eastern Corp.	543.3
19	Amerada Hess Corp.	365.9
20	Kerr-McGee Corp.	315.0
	Total	**35,024.1**

Rank	Company	U.S. net wells drilled
1	Shell Oil Co.	1,497.0
2	Mobil Corp.	754.0
3	Exxon Corp.	631.0
4	Amoco Corp.	603.0
5	Sun Co.	552.0
6	USX Corp. (Oil & Gas Segment)	443.0
7	Texaco Inc.	400.0
8	Chevron Corp.	352.0
9	ARCO (Atlantic Richfield Corp.)	323.0
10	Celeron Corp.	255.8
11	Consolidated Natural Gas Co.	241.0
12	Santa Fe Energy Co.	235.4
13	Conoco Inc.	197.5
14	Occidental Petroleum Corp.	188.2
15	Unocal Corp.	181.0
16	Standard Oil Co.	155.7
17	Equitable Resources Inc.	149.1
18	Pacific Lighting Oil and Gas Co.	143.4
19	BHP Petroleum (Americas), Inc.	137.0
20	Coastal Corp.	134.0
	Total	**7,573.1**

The top 20 in liquids reserves

Rank	Company	U.S. liquids reserves, million bbl
1	ARCO (Atlantic Richfield Corp.)	2,728.0
2	Shell Oil Co.	2,632.0
3	Exxon Corp.	2,627.0
4	Standard Oil Co.	2,406.2
5	Chevron Corp.	1,880.0
6	Texaco Inc.	1,654.0
7	Amoco Corp.	1,560.0
8	Mobil Corp.	1,014.0
9	Unocal Corp.	661.0
10	Sun Co.	649.0
11	USX (Oil & Gas Segment)	628.5
12	Phillips Petroleum Co.	355.0
13	Conoco Inc.	317.0
14	Tenneco Inc.	296.0
15	Union Exploration Partners Ltd.	234.0
16	Occidental Petroleum Corp.	229.0
17	Amerada Hess Corp.	201.0
18	Union Pacific Resources Co.	154.6
19	Pennzoil Co.	138.0
20	Santa Fe Energy Co.	124.4
	Total	**20,488.7**

Rank	Company	World liquid reserves, million bbl
1	Exxon Corp.	6,512.0
2	Chevron Corp.	3,513.0
3	Texaco Inc.	3,225.0
4	ARCO (Atlantic Richfield Corp.)	2,927.0
5	Shell Oil Co.	2,762.0
6	Mobil Corp.	2,460.0
7	Amoco Corp.	2,424.0
8	Standard Oil Co.	2,406.2
9	Conoco Corp.	948.0
10	Unocal Corp.	882.0
11	USX Corp. (Oil & Gas Segment)	802.8
12	Sun Co.	796.0
13	Occidental Petroleum Corp.	728.0
14	Phillips Petroleum Co.	718.0
15	Amerada Hess Corp.	458.0
16	Tenneco Inc.	437.0
17	Union Exploration Partners Ltd.	234.0
18	Union Pacific Resources Co.	165.2
19	Texas Eastern Corp.	148.1
20	Pennzoil Co.	140.0
	Total	**32,686.3**

Of the 116 companies that made a profit in fiscal 1986, five were limited partnerships, nine were royalty trusts, and eight were subsidiaries of other companies.

The top 20. The leading 20 companies in each performance category continue to account for at least two-thirds of the total for the 400-company group. And the share that each top 20 group has of the total increased this year in every category.

The top 20 companies represent 78% of total assets for the OGJ400, compared with 75% last year. For stockholders' equity, the 20 largest represent 82% of the total, up from a 78% share in 1985. In capital and exploratory spending the top 20 companies account for 79% of the total; last year's share was 76%.

The largest companies can also reverse a total for the rest of the group. For example, the top 20 in the net income category had net income totaling $12.86 billion, but for the entire group, net income was only $5.20 billion. The other 380 companies had a combined net loss of $7.66 billion.

The same companies are not in the top 20 in each performance category.

In the list of the 20 companies with the largest assets—the basis for ranking the OGJ400—19 of this year's leaders were also in last year's list. Texas Eastern, which had been No. 21, moved onto the list this year. Gone from the top 20 is MidCon Corp., which was purchased by Occidental. It was largely on the strength of that merger that Occidental jumped three slots to No. 9.

USX also moved up the list. Last year, Marathon and Texas Oil & Gas, USX's two operating segments, were reported separately. Data for both companies reported as USX Oil & Gas Segment made the list at No. 12 this year.

Spending, drilling. Capital spending by the OGJ400 group fell by one-third during fiscal 1986, compared with 1985. But because net income dropped much more dramatically, the ratio of capital and exploratory spending to net income almost doubled. During 1986, capital spending was 862% of net income, compared with 400% the year before.

Though spending is at a much lower level, this ratio does reflect some effort to continue at least some exploration and development work.

This year's performance results for the top 400 firms also reflect the growing share of drilling done by larger companies. With many small independent firms unable to obtain capital, OGJ400 companies did a bigger share of U.S. drilling last year. The major companies also appear set to lead the modest drilling recovery expected for the last half of 1987 (OGJ, July 27, p. 44).

During fiscal 1986, OGJ400 com-

The top 20 in gas reserves

Rank	Company	U.S. gas reserves, bcf
1	Exxon Corp.	17,970.0
2	Amoco Corp.	10,270.0
3	Mobil Corp.	7,855.0
4	Chevron Corp.	7,509.0
5	Standard Oil Co.	7,308.1
6	Shell Oil Co.	6,788.0
7	ARCO (Atlantic Richfield Corp.)	5,923.0
8	Texaco Inc.	5,132.0
9	Unocal Corp.	4,500.0
10	USX Corp. (Oil & Gas Segment)	3,435.8
11	Tenneco Inc.	3,245.0
12	Phillips Petroleum Co.	3,232.0
13	Merdian Oil Inc.	2,887.0
14	Occidental Petroleum Corp.	2,749.0
15	Union Exploration Partners Ltd.	2,534.0
16	Sun Co.	2,377.0
17	Mesa Limited Partnership	2,010.7
18	Conoco Inc.	1,977.0
19	Anadarko Petroleum Corp.	1,703.7
20	Union Pacific Resources Co.	1,537.2
	Total	**100,943.6**

Rank	Company	Worldwide gas reserves, bcf
1	Exxon Corp	29,430.0
2	Mobil Corp.	20,479.0
3	Amoco Corp.	15,375.0
4	Chevron Corp.	10,081.0
5	Texaco Inc.	8,165.0
6	Standard Oil Co.	7,308.1
7	Shell Oil Co.	7,020.0
8	ARCO (Atlantic Richfield Corp.)	6,895.0
9	Unocal Corp.	6,073.0
10	Phillips Petroleum Co.	5,144.0
11	USX Corp. (Oil & Gas Segment)	4,816.2
12	Tenneco Inc.	3,250.0
13	Conoco Inc.	3,114.0
14	Occidental Petroleum Corp.	2,982.0
15	Sun Co.	2,917.0
16	Meridian Oil Inc.	2,887.0
17	Union Exploration Partners Ltd.	2,534.0
18	Mesa Limited Parntership	2,010.7
19	Amerada Hess Corp.	1,936.0
20	Anadarko Petroleum Corp.	1,756.7
	Total	**144,173.7**

The top 20 in liquids production

Rank	Company	U.S. liquids production, million bbl
1	Exxon Corp.	278.0
2	Standard Oil Co.	263.1
3	ARCO (Atlantic Richfield Corp.)	240.0
4	Texaco Inc.	215.0
5	Shell Oil Co.	209.0
6	Chevron Corp.	199.0
7	Amoco Corp.	142.0
8	Mobil Corp.	114.0
9	USX Corp. (Oil & Gas Segment)	63.7
10	Unocal Corp.	63.0
11	Sun Co.	62.0
12	Conoco Inc.	46.0
13	Phillips Petroleum Co.	44.0
14	Tenneco Inc.	38.0
15	Occidental Petroleum Corp.	31.0
16	Union Pacific Resources Co.	25.1
17	Amerada Hess Corp.	25.0
18	Union Exploration Partners Ltd.	19.0
19	Santa Fe Energy Co.	17.2
20	Mitchell Energy & Development Co.	16.0
	Total	**2,110.1**

Rank	Company	Worldwide liquids production, million bbl
1	Exxon Corp.	626.0
2	Texaco Inc.	382.0
3	Chevron Corp.	346.0
4	Amoco Corp.	294.0
5	ARCO (Atlantic Richfield Corp.)	267.0
6	Standard Oil Co.	263.1
7	Mobil Corp.	237.0
8	Shell Oil Co.	216.0
9	Conoco Inc.	141.0
10	Occidental Petroleum Corp.	119.0
11	Unocal Corp.	98.0
12	USX Corp. (Oil & Gas Segment)	92.0
13	Phillips Petroleum Co.	84.0
14	Sun Co.	74.0
15	Amerada Hess Corp.	57.0
16	Tenneco Inc.	52.0
17	Diamond Shamrock Corp.	29.5
18	Union Texas Petroleum Holdings Inc.	29.0
19	Union Pacific Resources Co.	26.0
20	Murphy Oil Corp.	19.4
	Total	**3,452.1**

panies drilled 10,917 net wells in the U.S., accounting for about 28.5% of wells drilled. Last year the 400 did only about 25% of U.S. drilling; in 1983, only about 20%. Privately-owned companies account for the rest of the wells.

It's a sign that smaller companies have cut drilling programs most; many companies that drilled in 1983 did none at all in 1986.

Reserves, production. While financial results have dropped over the past five years—dramatically last year—gas and liquids production levels have held almost steady. Liquids reserves of the top 400 companies, both in the U.S. and worldwide, slipped only modestly in 1986 compared with the year before. And gas reserves held by the OGJ400 list increased marginally last year, both in the U.S. and elsewhere.

OGJ400's worldwide liquids reserves dropped 6.6% in fiscal 1986, due in part to the requirement that U.S. companies abandon their holdings in Libya. USX (Marathon), Occidental, Conoco, and Grace Petroleum together deducted more than 835 million bbl of Libyan reserves.

Worldwide gas reserves of the OGJ400 gained 0.7% during the year to about 181 tcf; gas reserves in the U.S. increased 0.5% to almost 130 tcf.

Because state-owned oil companies control much of the world's reserves and production, the top 400 U.S. companies account for modest shares. This year the group represents 17.3% of worldwide liquids production, 20.0% of worldwide gas production, and only 5% each of liquids and gas reserves.

But in the U.S., the OGJ400 this year accounts for 62.9% of liquids production, 63.3% of gas production, 71% of liquids reserves, and 70% of gas reserves.

Growth companies. Growth in stockholders' equity is the primary yardstick used to determine the fastest growing companies in the OGJ400 group. These companies have solid asset growth not heavily dependent on debt.

In selecting the fastest growing companies, OGJ also looks for good earnings. Companies with net losses in either 1985 or 1986 are eliminated, as are subsidiary companies which can grow by contributions from corporate parents.

And an increase in earnings in 1986 compared with 1985 is necessary to make the growth list.

One sign of the harshness of 1986 is that only 17 companies out of the OGJ400 could meet these criteria; normally, 20 are selected. The list also usually includes primarily small and medium-sized companies, but for 1986, it includes three of the top 25 companies and seven of the top 100

The top 20 in gas production

Rank	Company name	U.S. gas production, bcf
1	Exxon Corp.	818.0
2	Texaco Inc.	734.0
3	Chevron Corp.	719.0
4	Shell Oil Co.	653.0
5	Amoco Corp.	606.0
6	Mobil Corp.	558.0
7	ARCO (Atlantic Richfield Corp.)	527.0
8	Tenneco Inc.	370.0
9	USX Corp. (Oil & Gas Segment)	308.0
10	Phillips Petroleum Co.	283.0
11	Unocal Corp.	255.0
12	Conoco Inc.	248.0
13	Occidental Petroleum Corp.	244.0
14	Sun Co.	219.0
15	Meridian Oil Inc.	145.0
16	Enron Corp.	127.3
17	Union Exploration Partners Ltd.	123.0
18	Pennzoil Co.	121.0
19	Union Pacific Resources Co.	117.9
20	Consolidated Natural Gas Co.	112.0
	Total	**7,288.2**

Rank	Company name	World gas production, bcf
1	Exxon Corp.	1,449.0
2	Mobil Corp.	1,274.0
3	Amoco Corp.	1,004.0
4	Texaco Inc.	860.0
5	Chevron Corp.	818.0
6	Shell Oil Co.	575.0
7	ARCO (Atlantic Richfield Corp.)	490.0
8	Phillips Petroleum Co	401.0
9	USX Corp. (Oil & Gas Segment)	374.9
10	Tenneco Inc.	371.0
11	Unocal Corp.	362.0
12	Conoco Inc.	339.0
13	Occidental Petroleum Corp.	265.0
14	Sun Co.	252.0
15	Amerada Hess Corp.	169.0
16	Meridian Oil Inc.	145.0
17	Enron Corp.	131.4
18	Pennzoil Co.	127.0
19	Union Exploration Partners Ltd.	123.0
20	Union Pacific Resources Co.	122.7
	Total	**9,825.1**

firms.

Exxon, Mobil, and Ashland all added to equity and increased income during fiscal 1986. Exxon increased equity by 10%, not an easy task even under much better economic conditions.

Healthy refining margins helped offset upstream losses in some cases. And natural gas marketing and transportation operations helped other companies that made the list.

Five of the companies that made the fast-growing list last year are on the list again—Allegheny & Western Energy, Roseland Oil & Gas, Swift Energy, Energy Assets International, and Hadson.

One company represented on the growth list last year, Energy Oil, sold its oil and gas assets and was liquidated. Four of the companies from last year's growth list again showed strong gains in stockholders' equity, but did not make the list this year because income was down from the previous year.

And in '87? Fiscal 1987 will still be tough for many companies. The first half of the year was expected to be much like the last half of 1986 for those companies whose fiscal year coincides with the calendar year. Any improvement won't be reflected until second half 1987 data are in.

Though mixed, results for the first half of 1987 tended to confirm that midyear could be the turnaround point for this industry cycle.

In total, the net profits of the OGJ group of companies were down more than 17% in the first half of 1987, compared with first half 1986, and revenues fell slightly. For the second quarter, revenues were up 11% and net profits for the group dropped only 5.3%.

Companies heavily involved in refining, in some cases, had significant drops in the first half compared with the first half of 1986 when refining margins were healthier.

But many of these integrated firms showed better results in the second quarter, reflecting efficiencies made earlier.

Many companies are much better prepared today to operate profitably with $18-20/bbl crude than they were only a year ago.

With writedowns of reserves values behind them, streamlined organizations, and lower operating costs, many companies could do very well even with the moderate recovery that would result if prices stabilized at today's level.

And with the market signs still hard to read two-thirds of the way through the year, preparation will be a key to success. •

OGJ 400

Rank by total assets 1986	Rank by total assets 1985	Company	Total assets $000	Total revenue Rank	Total revenue $000	Net income Rank	Net income $000	Stockholders' equity Rank	Stockholders' equity $000	Capital & Expl. spending Rank	Capital & Expl. spending $000
1	1	**Exxon Corp.**	69,484,000	1	76,555,000	1	5,360,000	1	32,012,000	1	7,200,00
2	2	**Mobil Corp.**	39,412,000	2	49,865,000	2	1,407,000	3	15 239,000	3	3,046,00
3	4	**Texaco Inc.[1]**	34,940,000	3	32,591,000	5	725,000	5	13,739,000	6	2,369,00
4	3	**Chevron Corp.**	34,583,000	4	27,131,000	6	715,000	2	15,493,000	4	3,018,00
5	5	**Shell Oil Co.**	26,214,000	6	17,353,000	3	883,000	4	14,312,000	5	2,842,00
6	6	**Amoco Corp.**	23,706,000	5	20,231,000	4	747,000	6	11,324,000	2	3,181,00
7	8	**ARCO (Atlantic Richfield Corp.)**	21,604,000	8	15,774,000	7	615,000	9	5,259,000	7	1,822,00
8	7	**Tenneco Inc.**	18,021,000	9	14,617,000	351	(39,000)	10	4,412,000	10	1.188,00
9	12	**Occidental Petroleum Corp.**	17,466,777	7	16,028,519	13	181,064	11	4,308,341	13	979,35
10	9	**Standard Oil Co.[2]**	15,955,000	12	10,115,000	394	(345,000)	7	7,020,000	8	1,618,00
11	10	**Phillips Petroleum Co.**	12,399,000	13	10,015,000	10	228,000	13	1,724,000	17	655,00
12	14	**USX Corp. (Oil & Gas Segment)[3]**	11,977,000	14	8,963,000	32	[4]42,000	—	NA	12	1,022,00
13	11	**Sun Co.**	11,684,000	11	10,440,000	8	385,000	8	5,287,000	11	1,087,00
14	13	**Unocal Corp.**	10,133,000	15	8,253,000	15	176,000	14	1,681,000	14	862,00
15	15	**Conoco Inc.[5]**	9,073,000	10	11,039,000	9	[6]355,000	—	NA	9	1,410,00
16	16	**Enron Corp.**	8,489,632	16	7,561,967	24	57,663	23	1,208,652	28	231,67
17	17	**Coastal Corp.**	7,777,300	18	6,718,100	20	71,600	28	788,900	25	234,20
18	19	**Columbia Gas System Inc.**	5,590,161	22	3,389,354	18	86,847	16	1,498,644	27	232,28
19	21	**Texas Eastern Corp.**	5,249,175	19	4,103,243	79	1,267	22	1,241,988	18	543,31
20	18	**Amerada Hess Corp.**	4,914,054	20	4,062,255	386	(219,443)	12	2,050,482	19	365,93
21	25	**Transco Energy Co.**	4,257,436	21	3,706,126	272	(4,307)	34	630,656	36	163,34
22	29	**Consolidated Natural Gas Co.**	3,825,601	24	2,627,780	16	174,693	15	1,582,943	23	274,40
23	27	**Ashland Oil Inc.[8]**	3,804,749	17	7,373,898	11	208,571	26	971,044	21	314,16
24	23	**Diamond Shamrock Corp.[9]**	3,517,400	26	2,543,500	373	(115,600)	17	1,395,800	48	106,20
25	33	**Pennzoil Co.**	3,369,278	29	1,921,223	29	45,443	32	695,339	26	233,00
26	31	**Sonat Inc.**	3,288,484	32	1,792,632	391	(304,300)	24	975,546	35	168,12
27	32	**Enserch Corp.**	3,233,558	23	2,722,821	39	26,878	25	973,393	29	226,22
28	30	**Kerr-McGee Corp.**	3,090,000	25	2,569,000	390	(292,000)	19	1,338,000	20	315,00
29	42	**Mesa Limited Partnership**	2,620,608	57	359,638	22	70,605	20	1,303,438	99	23,27
30	36	**Meridian Oil Inc.[10]**	2,370,974	47	740,566	397	(658,968)	18	1,375,830	55	96,03
31	38	**Freeport-McMoRan Inc.**	2,358,540	53	629,668	40	25,695	36	610,744	15	763,35
32	45	**Arkla Inc.**	2,284,663	41	1,002,244	23	64,179	35	616,368	39	148,90
33	37	**Mitchell Energy & Development Co.[11]**	2,060,688	52	632,051	52	8,430	42	569,144	44	122,95
34	39	**Nicor Inc.**	2,025,010	31	1,806,921	12	183,146	43	535,542	41	138,37
35	35	**Murphy Oil Corp.**	1,980,315	36	1,369,817	383	(194,750)	30	776,686	37	160,84
36	41	**Union Texas Petroleum Holdings Inc.**	1,949,610	38	1,235,181	363	(57,488)	375	(382,094)	24	272,76
37	34	**Union Pacific Resources Co.[12]**	1,883,000	27	2.520,000	396	(521,000)	52	371,000	31	198,00
38	44	**Montana Power Co.**	1,835,933	50	655,419	19	86,474	29	782,234	51	103,94
39	43	**American Petrofina Inc.**	1,776,969	28	2,020,903	339	(24,569)	33	654,106	42	134,06
40	55	**Celeron Corp.[14]**	1,755,300	112	63,200	385	(212,200)	—	NA	16	737,10
41	40	**Valero Energy Corp.**	1,697,322	30	1,880,125	370	(99,888)	51	377,425	77	41,75
42	52	**Louisiana Land & Exploration Co.**	1,680,200	44	826,500	333	(20,600)	37	604,100	30	219,50
43	—	**Union Exploration Partners Ltd.[15]**	1,632,700	51	635,500	14	176,400	21	[16]1,276,600	32	187,20
44	86	**BHP Petroleum (Americas),Inc.[17,18]**	1,539,932	82	171,581	51	9,119	62	273,968	47	108,90
45	47	**Cabot Corp.[8]**	1,509,744	37	1,320,106	21	71,051	38	591,130	59	88,62
46	50	**Primark Corp.**	1,491,285	34	1,562,878	26	53,797	44	473,949	56	89,03
47	48	**Global Marine Inc.[1]**	1,450,100	76	185,500	384	(209,200)	100	81,700	135	7,50
48	—	**Anadarko Petroleum Corp.**	1,376,301	72	209,254	49	10,091	46	431,809	43	123,70
49	49	**Transco Exploration Partners Ltd.[19]**	1,209,079	64	258,914	393	(336,949)	31	[16]731,620	45	122,65
50	65	**National Fuel Gas Co.[8]**	1,011,267	43	909,799	30	43,407	55	337,209	53	97,10
51	51	**Ocean Drilling & Exploration Co.**	1,007,830	56	364,443	389	(262,747)	39	578,975	68	63,73

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orldwide liquids roduction Mill bbl	Worldwide natural gas production Rank	Worldwide natural gas production Bcf	Worldwide liquids reserves Rank	Worldwide liquids reserves Mill bbl	Worldwide natural gas reserves Rank	Worldwide natural gas reserves Bcf	U.S. liquids production Rank	U.S. liquids production Mill bbl	U.S. natural gas production Rank	U.S. natural gas production Bcf	U.S. liquids reserves Rank	U.S. liquids reserves Mill bbl	U.S. natural gas reserves Rank	U.S. natural gas reserves Bcf	U.S. net wells drilled Rank	U.S. net wells drilled Wells
626.0	1	1,449.0	1	6,512.0	1	29,430.0	1	278.0	1	818.0	3	2,627.0	1	17,970.0	3	631.00
237.0	2	1,274.0	6	2,460.0	2	20,479.0	8	114.0	6	558.0	8	1,014.0	3	7,855.0	2	754.00
382.0	4	860.0	3	3,225.0	5	8,165.0	4	215.0	2	734.0	6	1,654.0	8	5,132.0	7	400.00
346.0	5	818.0	2	3,513.0	4	10,081.0	6	199.0	3	719.0	5	1,880.0	4	7,509.0	8	352.00
216.0	6	662.0	5	2,762.0	7	7,020.0	5	209.0	4	653.0	2	2,632.0	6	6,788.0	1	1,497.00
294.0	3	1,004.0	7	2,424.0	3	15,375.0	7	142.0	5	606.0	7	1,560.0	2	10,270.0	4	603.00
267.0	7	575.0	4	2,927.0	8	6,895.0	3	240.0	7	527.0	1	2,728.0	7	5,923.0	9	323.00
52.00	10	371.0	16	437.0	12	3,250.0	14	38.00	8	370.0	14	296.0	11	3,245.0	23	117.60
119.0	13	265.0	13	728.0	14	2,982.0	15	31.00	13	244.0	16	229.0	14	2,749.0	14	188.20
263.1	27	85.50	8	2,406.2	6	7,308.1	2	263.1	24	85.50	4	2,406.2	5	7,308.1	16	155.70
84.00	8	401.0	14	718.0	10	5,144.0	13	44.00	10	283.0	12	355.0	12	3,232.0	22	124.00
92.03	9	374.9	11	802.8	11	4,816.2	9	63.74	9	308.0	11	628.5	10	3,435.8	6	443.00
74.00	14	252.0	12	796.0	15	2,917.0	11	62.00	14	219.0	10	649.0	16	2,377.0	5	552.00
98.00	11	362.0	10	882.0	9	6,073.0	10	63.00	11	255.0	9	661.0	9	4,500.0	15	181.00
141.0	12	339.0	9	948.0	13	3,114.0	12	46.00	12	248.0	13	317.0	18	1,977.0	13	197.50
4.642	17	131.4	38	41.37	23	1,498.6	42	3.913	16	127.3	32	36.00	21	1,434.8	31	75.19
4.068	32	70.50	44	28.56	25	1,172.9	40	[7]4.068	30	[7]70.50	37	[7]28.56	23	[7]1,172.9	20	134.00
4.295	35	68.05	67	12.70	33	885.0	64	1.667	33	66.09	83	7.096	29	742.3	37	55.00
17.71	37	66.73	19	148.1	40	584.3	95	0.822	62	17.80	89	6.659	68	156.3	118	6.29
57.00	15	169.0	15	458.0	19	1,936.0	17	25.00	25	84.00	17	201.0	27	822.0	73	20.00
4.179	38	66.22	58	19.64	43	527.6	39	4.179	32	66.22	48	18.13	43	402.3	46	37.30
4.856	22	112.0	50	23.46	24	1,198.0	36	[7]4.856	20	[7]112.0	43	[7]23.46	22	[7]1,198.0	11	241.00
12.20	74	13.90	35	58.20	70	206.8	82	1.000	68	13.90	125	3.000	61	206.8	44	38.00
29.53	23	105.6	21	139.9	32	890.0	34	5.408	23	91.69	29	40.95	28	749.6	32	71.40
12.00	18	127.0	20	140.0	29	964.0	21	12.00	18	121.0	19	138.0	26	883.0	26	94.40
3.086	49	36.30	80	8.596	65	219.8	48	3.086	46	36.30	73	8.596	56	219.8	66	21.71
10.70	33	70.37	32	64.48	28	1,000.1	24	10.26	31	70.37	27	60.57	25	1,000.1	28	85.30
15.80	36	67.70	27	97.50	35	765.9	27	7.100	34	60.30	33	34.90	34	615.7	57	25.84
5.544	24	94.23	51	23.14	18	2,010.7	33	5.544	21	94.23	44	23.14	17	2,010.7	120	6.00
11.10	16	145.0	28	93.30	16	2,887.0	23	11.10	15	145.0	23	93.30	13	2,887.0	21	131.40
3.400	43	44.30	31	74.90	34	854.1	47	3.200	42	39.30	24	73.20	31	714.2	56	[7]27.12
0.318	46	39.00	105	5.388	36	731.7	138	0.318	43	39.00	100	5.388	30	731.7	51	30.54
16.00	39	59.90	26	97.60	41	580.5	20	16.00	36	59.90	22	97.60	36	580.5	35	56.60
1.300	72	14.50	95	6.700	88	107.2	73	1.300	66	14.50	88	6.700	81	107.2	74	18.80
19.40	34	69.30	25	108.8	38	625.1	31	5.800	35	60.20	35	31.30	47	318.5	60	24.60
29.00	21	119.0	22	125.0	22	1,553.0	29	6.000	38	46.00	40	25.00	49	290.0	39	52.06
26.00	20	122.7	18	165.2	21	1,678.5	16	25.10	19	117.9	18	154.6	20	1,537.2	27	87.00
[13]0.428	66	[13]16.14	122	[13]3.799	51	[13]351.0	152	[13]0.242	91	[13]7.747	146	[13]1.903	72	[13]135.9	55	[13]28.71
6.337	59	25.52	42	33.10	64	239.2	28	6.337	55	25.52	34	33.10	55	239.2	38	54.90
3.462	97	7.844	24	123.4	75	178.2	45	3.462	90	7.844	21	123.4	67	178.2	10	255.80
0.203	215	0.740	134	2.876	200	10.04	163	0.203	211	0.740	129	2.876	196	10.04	92	12.26
16.50	26	91.80	29	92.60	30	913.2	22	12.00	27	77.50	26	62.10	32	676.8	42	40.70
19.00	19	123.0	17	234.0	17	2,534.0	18	19.00	17	123.0	15	234.0	15	2,534.0	41	45.00
4.610	58	27.36	30	75.85	37	676.9	37	4.572	54	27.08	25	72.85	33	632.5	19	137.00
1.533	52	34.90	82	8.301	44	500.7	67	1.533	49	34.90	76	8.301	38	500.7	33	62.20
0.110	140	3.460	367	0.017	155	27.00	195	0.110	138	3.460	366	0.017	150	27.00	—	NA
0.367	98	7.577	160	1.662	127	45.04	134	0.367	92	7.577	155	1.662	121	45.04	171	2.99
4.641	30	78.75	56	20.08	20	1,756.7	38	4.185	28	77.25	50	16.07	19	1,703.7	29	80.30
5.797	25	91.86	47	25.14	42	558.1	32	5.797	22	91.86	39	25.14	37	558.1	47	37.30
0.308	81	12.08	196	0.898	89	106.8	140	0.308	76	12.08	192	0.898	82	106.8	36	56.00
9.600	41	52.70	36	45.20	57	305.2	44	3.500	37	52.10	51	15.70	54	245.3	90	12.85

Rank by total assets 1986	Rank by total assets 1985	Company	Total assets $000	Total revenue Rank	Total revenue $000	Net income Rank	Net income $000	Stockholders' equity Rank	Stockholders' equity $000	Capital & spend Rank
52	60	**Questar Corp.**	968,160	54	528,304	31	43,164	48	413,798	65
53	—	**Enserch Exploration Partners Ltd.**[20]	964,586	68	228,034	27	53,073	27	[16]797,116	40
54	70	**Equitable Resources Inc.**	939,695	55	457,217	25	54,118	47	414,503	52
55	53	**Grace Natural Resources Group**[21]	[22]939,000	58	338,000	—	NA	—	NA	101
56	58	**Oneok Inc.**[23]	936,363	48	736,776	34	34,460	54	341,288	57
57	61	**Total Petroleum (North America) Ltd.**	920,212	33	1,597,353	33	37,955	53	343,682	34
58	64	**Rowan Cos. Inc.**	919,096	83	167,163	353	(42,147)	40	578,925	49
59	56	**Zapata Corp.**[8]	875,431	69	225,219	388	(250,928)	77	144,530	84
60	57	**Santa Fe Energy Co.**[25]	867,000	65	256,900	380	[26](154,500)	—	NA	38
61	62	**Hamilton Oil Corp.**	863,821	62	273,986	48	11,007	59	294,729	85
62	—	**Freeport-McMoRan Energy Partners Ltd.**[27]	842,847	88	141,291	392	(306,520)	41	[16]576,871	58
63	69	**Reading & Bates Corp.**	793,516	86	158,281	379	(145,805)	85	122,193	46
64	72	**Diversified Energies Inc.**	759,652	46	780,371	323	(14,858)	65	256,864	70
65	90	**Apache Corp.**	728,855	81	171,656	309	(10,873)	68	207,379	33
66	73	**Unimar Co.**[28]	699,550	78	182,451	340	(24,602)	60	288,818	80
67	78	**Yankee Cos.**[29]	699,346	60	326,842	67	2,970	122	32,599	166
68	66	**Apache Petroleum Co. L.P.**[31]	686,575	75	190,965	381	(182,761)	56	[16]320,275	22
69	76	**CENEX (Farmers Union Central Exchange Inc.)**[8]	665,242	39	1,093,181	314	[32](12,061)	61	[33]283,246	102
70	79	**Quaker State Corp.**	665,042	42	917,135	28	50,288	50	390,661	64
71	89	**Noble Affiliates Inc.**	590,179	91	129,285	366	(64,258)	66	215,992	60
72	74	**Pogo Producing Co.**	582,330	87	151,071	365	(58,296)	363	(13,133)	69
73	67	**Tesoro Petroleum Corp.**[8]	566,868	35	1,478,600	377	(124,842)	69	197,543	82
74	84	**Helmerich & Payne Inc.**[8]	563,236	85	160,368	55	7,025	49	408,185	67
75	120	**Moore McCormack Energy Inc.**[34]	551,159	59	334,148	374	(116,485)	64	263,190	76
76	81	**Tidewater Inc.**[35]	530,084	66	244,743	328	(18,645)	63	272,366	74
77	80	**Tosco Corp.**	491,889	45	790,717	43	17,580	76	150,253	105
78	91	**Forest Oil Corp.**	471,047	102	89,275	263	(3,702)	101	78,800	75
79	95	**CSX Oil & Gas Corp.**[38]	460,161	71	214,969	71	1,934	67	215,010	62
80	85	**Sunshine Mining Co.**	458,644	90	133,952	371	(103,250)	84	122,641	108
81	87	**Adobe Resources Corp.**	455,609	95	112,010	357	(43,722)	57	301,795	88
82	88	**Southern Union Co.**	455,123	73	199,829	78	1,282	80	130,884	87
83	75	**Kaneb Services Inc.**	453,542	94	113,655	382	(184,224)	81	129,791	94
84	—	**Diamond Shamrock Offshore Parners L.P.**[39]	451,382	97	106,538	361	(54,594)	45	[16]443,857	93
85	101	**Primary Fuels Inc.**[40]	430,668	99	105,376	—	NA	—	NA	92
86	94	**Crown Central Petroleum Corp.**	427,764	40	1,057,795	332	(20,231)	74	168,774	73
87	59	**American Royalty Trust**[29]	425,523	74	192,110	17	97,783	72	193,394	—
88	—	**Santa Fe Energy Partners L.P.**[42]	399,200	96	110,100	378	(125,900)	58	296,000	50
89	63	**FPCO Oil & Gas Co.**[29,43]	397,612	80	176,106	395	(415,570)	374	(251,664)	95
90	—	**Pacific Lighting Oil & Gas Co.**[44]	387,424	92	122,564	372	[45](107,677)	70	196,290	54
91	97	**First Mississippi Corp.**[29]	304,111	63	272,789	344	(28,110)	78	142,070	89
92	98	**National Cooperative Refinery Association**[29]	298,982	49	730,468	355	[46](42,686)	86	[47]120,869	90
93	103	**Sabine Corp.**	294,730	110	64,113	346	(35,453)	73	191,316	78
94	—	**NRM Energy Co. L.P.**[48]	277,956	116	53,822	338	(24,300)	75	[16]157,407	72
95	104	**Seagull Energy Corp.**	264,395	79	176,971	206	(1,326)	91	101,012	114
96	113	**Triton Energy Corp.**[35]	263,893	103	86,187	354	(42,387)	89	104,293	63
97	105	**DeKalb Energy Cos.**[23,49]	262,000	104	84,300	342	[50](27,400)	—	NA	71
98	109	**Southwestern Energy Co.**	260,349	105	78,892	46	15,422	99	81,879	103
99	107	**NUI Corp.**[8]	239,794	61	278,278	312	(11,895)	112	49,988	97
100	108	**TGX Corp.**[51]	236,774	146	24,585	92	721	93	95,849	171
101	99	**Quinoco Cos.**[52]	209,288	115	57,453	375	(121,365)	71	193,877	242
102	96	**Home Petroleum Corp.**[23,53]	201,798	118	52,474	298	(8,288)	—	NA	81

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Worldwide liquids production		Worldwide natural gas production		Worldwide liquids reserves		Worldwide natural gas reserves		U.S. liquids production		U.S. natural gas production		U.S. liquids reserves		U.S. natural gas reserves		U.S. net wells drilled	
Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Wells
56	2.963	57	27.36	62	14.52	46	469.5	50	2.963	53	27.36	53	14.52	40	469.5	93	12.00
62	2.375	28	81.14	57	19.97	27	1,141.1	54	2.375	26	81.14	46	19.97	24	1,141.1	25	98.00
110	0.631	51	35.43	86	7.647	39	594.6	103	0.631	48	35.43	80	7.647	35	594.6	17	149.10
72	1.593	61	23.45	79	8.811	67	215.3	66	1.568	58	22.77	72	8.741	63	203.1	85	13.50
111	0.612	85	11.09	120	3.901	84	124.0	104	0.612	81	11.09	114	3.901	74	124.0	63	23.87
31	10.32	40	56.76	39	40.55	56	333.1	26	7.140	40	40.87	65	11.48	93	84.47	71	20.70
—	[24]NA	—	[24]NA	—	[24]NA	—	[24]NA	—	[24]NA	—	[24]NA	—	[24]NA	—	[24]NA	—	NA
142	0.311	107	6.130	138	2.783	78	140.0	144	0.263	121	4.678	154	1.674	80	108.9	123	5.62
23	17.20	62	22.30	23	124.4	74	191.6	19	17.20	59	22.30	20	124.4	66	191.6	12	235.40
52	3.407	42	45.07	34	59.84	31	905.5	127	0.427	112	5.442	127	2.948	143	29.06	290	0.25
57	2.936	44	44.11	61	14.86	45	474.1	51	2.936	39	44.11	52	14.86	39	474.1	68	21.00
64	2.289	102	7.098	75	9.973	90	106.2	90	0.879	100	6.179	75	8.338	83	106.2	106	8.37
124	0.493	83	11.60	141	2.697	87	109.1	119	0.493	78	11.60	134	[7]2.697	79	[7]109.1	110	8.01
67	1.989	47	38.65	72	[7]11.37	60	[7]297.3	59	1.989	44	38.65	66	[7]11.37	48	[7]297.3	80	14.62
63	2.343	29	80.32	52	23.06	26	1,168.2	77	1.213	80	11.18	91	6.430	104	67.99	108	8.18
324	0.015	264	0.222	338	[30]0.063	306	[30]1.194	322	0.015	261	0.222	337	[30]0.063	304	[30]1.194	157	3.44
51	3.456	31	71.70	60	[7]16.35	48	[7]410.1	46	3.456	29	71.70	49	[7]16.35	42	[7]410.1	54	29.30
65	2.140	194	1.212	69	11.87	218	6.997	55	2.140	188	1.212	60	11.87	215	6.997	88	13.00
88	1.025	130	4.048	74	10.56	108	77.00	81	1.025	127	4.048	68	10.56	98	77.00	30	79.70
55	3.075	53	34.73	43	31.72	49	373.5	53	2.837	50	34.08	36	29.29	45	359.8	67	21.01
49	3.736	45	40.12	55	22.06	54	343.9	43	3.736	41	40.12	45	21.59	52	262.2	58	25.50
73	1.556	160	2.475	145	2.500	119	55.53	107	0.592	158	2.467	138	2.500	151	26.30	159	3.39
87	1.123	82	12.00	83	8.278	63	245.5	80	1.123	77	12.00	77	8.278	53	245.5	99	10.33
112	0.601	158	2.570	81	8.516	118	57.00	105	0.601	156	2.570	74	8.516	111	57.00	203	1.71
84	1.177	220	0.617	103	5.851	260	2.988	366	0.004	294	0.120	371	0.014	338	0.419	—	NA
148	0.262	289	0.130	49	[38]24.00	345	0.362	145	0.262	286	0.130	42	[38]24.00	344	0.362	167	[37]3.00
105	0.660	48	37.61	109	5.096	55	340.3	113	0.557	45	36.92	117	3.462	51	282.1	107	8.20
61	2.395	50	35.64	63	13.90	53	345.6	56	2.113	47	35.63	63	11.59	58	217.7	50	34.34
80	1.303	69	15.48	96	6.643	79	139.8	75	1.246	71	13.12	98	5.611	95	81.17	89	12.95
44	4.224	64	18.04	41	33.94	66	218.0	49	2.996	61	18.04	38	26.90	57	218.0	83	14.00
153	0.245	144	3.176	151	1.923	102	84.69	150	0.245	142	3.176	145	1.923	92	84.69	122	5.70
95	0.884	80	12.11	106	5.299	100	86.19	89	0.884	75	12.11	101	5.299	90	86.19	52	30.00
69	1.733	55	32.31	65	13.58	69	208.3	61	1.733	52	32.31	56	13.58	60	208.3	152	3.70
46	4.114	56	31.16	54	22.32	59	301.5	60	1.928	56	24.51	64	11.49	73	134.4	—	NA
92	0.936	92	8.864	101	5.976	106	78.92	86	0.936	86	8.864	95	5.976	97	78.92	138	4.72
33	9.188	54	32.97	33	59.96	50	365.9	25	9.188	51	32.97	28	59.96	44	365.9	163	3.10
48	4.000	60	24.40	48	24.40	72	202.6	41	4.000	57	24.40	41	24.40	64	202.6	40	49.50
36	5.828	63	20.52	40	38.12	73	197.3	30	5.828	60	20.52	30	38.12	65	197.3	24	117.43
35	6.036	65	16.40	37	42.50	77	141.1	35	5.405	65	14.66	31	37.17	77	115.7	18	143.40
115	0.569	112	5.718	159	1.683	131	42.59	109	0.569	105	5.718	153	1.683	125	42.59	86	13.10
75	1.482	134	3.734	84	8.189	128	44.50	68	1.482	133	3.734	78	8.189	122	44.50	34	57.00
66	2.000	77	12.80	68	12.30	85	121.7	58	2.000	72	12.80	59	12.30	75	121.7	62	23.94
86	1.158	73	14.35	70	11.84	81	138.1	79	1.158	67	14.35	61	11.84	71	138.1	127	5.40
293	0.026	132	3.802	212	0.682	150	28.69	290	0.026	130	3.802	210	0.682	144	28.69	267	0.50
60	2.727	136	3.668	45	27.31	164	22.02	124	0.456	144	2.968	175	1.271	184	13.12	104	8.83
59	2.800	71	14.60	46	26.90	58	301.6	57	2.000	117	5.100	58	12.50	115	52.40	61	24.00
157	0.234	87	10.29	200	0.849	71	205.8	155	0.234	83	10.29	196	0.849	62	205.8	69	21.00
230	0.078	206	0.927	263	0.267	291	1.744	227	0.078	201	0.927	261	0.267	288	1.744	87	13.10
154	0.243	129	4.180	127	3.301	68	209.3	151	0.243	126	4.180	120	3.301	59	209.3	272	0.46
71	1.656	70	14.92	91	7.093	76	152.9	65	1.656	64	14.92	84	7.093	69	152.9	—	NA
82	1.298	377	0.009	85	7.904	364	0.122	74	1.298	375	0.009	79	7.904	363	0.122	64	23.00

Rank by total assets 1986	Rank by total assets 1985	Company	Total assets $000	Total revenue Rank	Total revenue $000	Net income Rank	Net income $000	Stockholders' equity Rank	Stockholders' equity $000	Capital & Ex spending Rank	Capital & Ex spending $00
103	114	NOMECO (Northern Michigan Exploration[54]	200,993	107	71,298	194	(976)	83	126,946	86	32
104	133	Allegheny & Western Energy Corp.[29]	198,325	67	239,366	44	16,740	106	67,934	116	12
105	106	Texas International Co.[56]	195,699	111	63,717	360	(50,798)	373	(132,561)	133	7
106	112	Prairie Producing Co.[57]	195,697	145	24,782	362	[26](55,678)	371	(82,166)	98	23
107	—	Norcen Energy Resources Ltd.[58]	184,226	179	12,595	213	(1,479)	116	42,971	79	37
108	110	Pelto Oil Co.[59]	182,067	126	40,294	359	[59](45,742)	—	NA	91	29
109	100	Damson Oil Corp.[8]	175,884	121	49,410	368	(74,642)	174	9,366	127	9
110	111	Kaiser Energy Inc.[60]	175,586	149	22,601	347	(35,575)	95	92,918	115	12
111	146	Hadson Corp.[61]	162,602	70	216,823	57	4,908	118	40,717	107	14
112	127	Pyro Energy Corp.	159,061	98	105,474	58	4,775	104	71,890	143	6
113	117	Howell Corp.	158,103	101	93,938	331	(19,961)	110	53,813	138	7
114	118	Felmont Oil Corp.[62]	156,496	113	59,423	60	3,829	82	129,561	113	13
115	—	Ram Industries Inc.[35,63]	153,935	400	0	117	0	79	131,726	382	
116	138	Park-Ohio Industries Inc.	152,899	89	138,561	294	(7,749)	97	84,067	162	4
117	183	Statex Petroleum Inc.[64]	140,274	178	13,086	222	[8](1,848)	—	NA	—	
118	—	Kaneb Energy Partners Ltd.[65]	133,070	123	[66]46,870	376	[66](121,402)	92	99,303	112	[66]1
119	—	Avalon Corp.	130,858	165	16,463	68	2,347	90	102,116	159	4
120	119	Kirby Exploration Co. Inc.	129,071	109	64,147	341	(26,417)	115	46,369	168	4
121	209	Harken Oil & Gas Inc.	125,222	239	4,379	108	196	125	30,979	150	5
122	125	Wainoco Oil Corp.	124,756	127	37,552	330	(19,953)	253	2,294	152	5
123	132	Texas American Energy Corp.	123,479	93	121,799	317	(13,727)	229	3,329	131	8
124	126	Cenergy Corp.	123,332	128	36,988	285	(6,478)	117	41,433	104	15
125	140	Snyder Oil Partners L.P.	122,381	138	27,531	352	(41,517)	87	108,653	66	66
126	131	Sage Energy Co.[29]	122,367	120	49,507	282	(5,912)	107	67,675	83	34
127	—	Wintershall Corp.[58]	118,393	152	22,133	—	NA	—	NA	61	84
128	—	Noble Drilling Corp.	115,627	130	35,837	358	(43,955)	105	70,924	163	4
129	149	Global Natural Resources Inc.	114,194	131	34,843	59	4,063	94	93,184	129	8
130	122	Ensource Inc.	113,860	129	36,806	261	(3,497)	134	24,474	124	9
131	142	Wiser Oil Co.	109,760	133	32,906	74	1,598	96	91,676	111	13
132	115	Universal Resources Corp.[67]	108,566	142	26,658	369	(85,419)	124	31,513	130	8
133	145	San Juan Basin Royalty Trust	107,181	154	21,148	42	20,681	88	[68]105,863	—	
134	134	Asamera Inc.[58]	103,936	77	183,402	321	(14,767)	—	NA	148	6
135	116	MCO Resources Inc.	102,594	135	31,396	350	(38,555)	211	5,020	175	3
136	102	Crystal Oil Co.[69]	101,927	119	51,373	387	(232,182)	162	12,722	158	5
137	129	Conquest Exploration Co.	98,011	163	17,302	06	(9,806)	103	74,531	10	13
138	128	Consolidated Oil & Gas Inc.[70]	97,033	157	19,830	35	(21,520)	65	(16,728)	01	2
139	—	Integrated Drilling & Exploration Inc.[71]	91,032	147	24,251	64	(3,752)	98	83,916	25	9
140	150	Unit Corp.[72]	90,807	143	26,413	00	(8,435)	113	49,703	09	14
141	173	American Exploration Co.	88,286	176	13,259	311	(11,462)	154	15,721	100	23
142	151	Flag-Redfern Oil Co.	86,238	141	27,085	105	213	108	65,353	120	9
143	141	Graham-McCormick Oil & Gas Partnership	82,053	151	22,367	343	(27,402)	202	[16]5,600	174	3
144	139	Chieftain Development Co. Ltd.[58]	82,049	169	14,919	137	[73](167)	—	NA	149	6
145	124	Tom Brown Inc.[35]	81,442	134	32,007	367	(72,951)	94	6,365	118	11
146	157	SPG Exploration Corp.[74]	79,697	148	24,105	277	[8](5,141)	—	NA	160	4
147	143	Freeport-McMoRan Oil & Gas Royalty Trust	78,554	139	27,245	47	12,708	102	[68]77,239	—	
148	—	Exploration Co. of Louisiana Inc.	74,663	198	8,753	101	314	111	52,198	123	9
149	152	May Petroleum Inc.	64,748	156	20,375	329	(19,322)	119	40,459	121	9
150	161	Pauley Petroleum Inc.[22]	64,589	84	164,991	56	5,004	130	27,775	134	7
151	137	Houston Oil Trust	61,064	160	18,678	45	15,801	109	[68]61,064	—	
152	181	Tribune/Swab-Fox Cos. Inc.	56,340	117	53,506	245	(2,745)	135	24,010	211	1
153	169	Equity Oil Co.	56,145	184	11,732	180	(789)	120	39,039	155	5

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Worldwide liquids production		Worldwide natural gas production		Worldwide liquids reserves		Worldwide natural gas reserves		U.S. liquids production		U.S. natural gas production		U.S. liquids reserves		U.S. natural gas reserves		U.S. net wells drilled	
nk	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Wells
68	1.900	84	11.30	92	6.900	107	78.20	62	[55]1.718	79	[55]11.30	97	[55]5.800	102	[55]70.70	72	20.28
74	0.002	198	1.147	363	0.022	162	23.38	373	0.002	192	1.147	362	0.022	158	23.38	78	16.10
58	2.926	94	7.968	53	22.76	95	98.54	52	2.875	101	6.130	54	14.30	106	63.16	150	3.83
04	0.661	101	7.230	76	9.160	114	61.44	99	0.661	95	7.230	69	9.160	108	61.44	—	NA
20	0.523	125	4.596	116	4.200	92	105.0	116	0.523	122	4.596	110	4.200	84	105.0	65	22.40
00	0.801	75	13.73	93	6.857	86	111.7	96	0.801	69	13.73	86	6.857	78	111.7	91	12.50
09	0.647	106	6.367	144	[7]2.594	110	[7]73.90	102	0.647	99	6.367	136	[7]2.594	100	[7]73.90	109	8.10
47	0.270	116	5.514	167	1.447	96	96.90	143	0.270	108	5.514	163	1.447	87	96.90	111	8.00
31	0.426	109	5.900	156	1.731	137	36.87	128	0.426	102	5.900	151	1.731	131	36.87	94	12.00
70	0.190	173	1.609	169	1.365	172	17.16	166	9.190	169	1.609	166	1.365	168	17.16	185	2.16
94	0.896	128	4.308	89	7.237	104	82.08	88	0.890	128	3.981	85	7.053	105	64.93	153	3.64
98	0.851	78	12.57	131	3.033	111	72.66	93	0.851	73	12.57	124	3.033	101	72.66	53	29.40
—	—	—	—	104	5.402	47	463.9	—	—	—	—	99	5.402	41	463.9	—	—
87	0.141	142	3.315	153	1.847	123	51.01	184	0.141	140	3.315	148	1.847	117	51.01	132	5.00
66	0.204	137	3.623	150	1.938	105	80.95	162	0.204	135	3.623	144	1.938	96	80.95	—	NA
90	[66]0.974	76	[66]13.21	98	6.421	93	104.4	84	[66]0.974	70	[66]13.21	92	6.421	85	104.4	49	[66]35.00
61	0.217	153	2.706	137	2.816	91	105.1	224	0.079	378	0.005	201	0.795	375	0.064	276	0.40
19	0.544	146	2.914	132	2.983	163	22.95	114	0.544	145	2.914	126	2.983	159	22.95	186	2.15
13	0.092	303	0.110	173	1.304	212	8.108	209	0.092	301	0.110	170	1.304	209	8.108	—	NA
02	0.723	67	16.10	108	5.102	62	268.1	129	0.423	132	3.741	141	2.221	113	53.52	254	0.65
28	0.445	162	2.066	126	3.322	180	15.56	125	0.445	160	2.066	119	3.322	176	15.56	297	0.15
91	0.973	115	5.554	110	5.001	117	60.09	85	0.973	107	5.554	104	5.001	110	60.09	119	6.10
97	0.866	104	6.810	77	9.057	101	85.04	92	0.866	97	6.810	70	9.057	91	85.04	96	10.70
78	1.321	111	5.859	88	7.252	148	30.78	71	1.321	104	5.859	81	7.252	141	30.78	75	17.79
01	0.745	121	5.329	—	NA	—	NA	97	0.745	115	5.329	—	NA	—	NA	43	40.00
57	0.048	260	0.235	234	0.438	276	2.307	254	0.048	257	0.235	232	0.438	274	2.307	141	4.10
36	0.376	91	9.096	123	3.766	83	124.8	136	0.352	109	5.491	137	2.533	124	43.29	84	14.00
16	0.565	90	9.288	121	3.807	97	94.43	110	0.565	85	9.288	115	3.807	88	94.43	114	7.18
93	0.934	117	5.480	78	8.913	103	83.42	87	0.934	110	5.480	71	8.913	94	83.42	45	37.70
17	0.565	100	7.255	136	2.827	122	52.12	111	0.565	94	7.255	131	2.827	116	52.12	113	7.34
47	0.058	86	10.73	185	1.087	61	283.1	244	0.058	82	10.73	182	1.087	50	283.1	194	1.96
92	0.027	335	0.059	357	0.028	362	0.141	289	0.027	333	0.059	356	0.028	361	0.141	266	0.55
07	0.659	88	10.17	130	3.054	109	74.14	101	0.659	84	10.17	123	3.054	99	74.14	201	1.77
70	1.715	79	12.24	90	7.201	115	61.05	63	1.715	74	12.24	82	7.201	109	61.05	155	3.50
44	0.299	103	7.000	177	1.283	134	41.23	141	0.299	96	7.000	174	1.283	127	41.23	—	—
21	0.498	114	5.627	107	5.194	82	127.0	120	0.487	116	5.308	103	5.045	76	119.6	216	1.32
00	0.109	150	2.833	183	1.124	136	40.89	196	0.109	149	2.833	180	1.124	129	40.89	115	7.00
80	0.155	156	2.616	201	0.829	168	20.43	177	0.155	154	2.616	197	0.829	163	20.43	148	3.85
38	0.356	143	3.279	125	3.401	151	28.69	135	0.356	141	3.279	118	3.401	145	28.69	198	1.89
89	0.978	122	4.984	102	5.919	139	36.44	83	0.978	118	4.984	96	5.919	133	36.44	100	10.20
14	0.016	120	5.334	184	1.119	98	91.82	311	0.016	114	5.334	181	1.119	89	91.82	—	—
13	0.597	259	0.246	111	4.888	207	8.928	106	0.597	256	0.246	105	4.888	203	8.928	212	1.43
96	0.869	141	3.384	113	4.515	124	50.42	91	0.869	139	3.384	107	4.515	118	50.42	82	14.30
39	0.336	96	7.889	—	[24]NA	—	[24]NA	137	0.336	89	7.889	—	[24]NA	—	[24]NA	133	5.00
41	0.317	93	8.049	217	0.656	138	36.66	139	0.317	87	8.049	215	0.656	132	36.66	—	NA
60	0.220	155	2.633	157	1.710	113	63.06	157	0.220	153	2.633	152	1.710	107	63.06	182	2.24
62	0.214	99	7.279	223	0.598	143	33.87	158	0.214	93	7.279	221	0.598	137	33.87	151	3.80
76	1.405	219	0.660	73	10.69	239	4.330	69	1.405	216	0.660	67	10.69	237	4.330	146	3.90
22	[75]0.496	118	[75]5.456	163	[75]1.545	147	[75]31.26	117	[75]0.496	111	[75]5.456	158	[75]1.545	140	[75]31.26	225	1.10
48	0.058	218	0.700	296	0.155	253	3.224	245	0.058	214	0.700	294	0.155	251	3.224	282	0.34
08	0.650	202	1.004	87	7.322	129	43.36	115	0.539	208	0.770	102	5.250	130	38.49	220	1.22

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Rank by total assets			Total assets	Total revenue		Net income		Stockholders' equity		Capital & Expl. spending	
1986	1985	Company	$000	Rank	$000	Rank	$000	Rank	$000	Rank	$000
154	154	**Callon Petroleum Co.**	55,788	161	18,388	348	(37,156)	370	(40,104)	122	9,8
155	172	**OKC Limited Partnership**	55,200	114	58,787	38	27,673	114	[16]47,765	119	10,7
156	203	**Ethyl Corp. (Energy Segment)[76]**	54,288	124	46,499	61	[50]3,696	—	NA	132	7,9
157	153	**Entex Energy Development Ltd.**	53,373	159	19,277	349	(37,417)	136	[16]23,782	169	4,1
158	163	**Alamco Inc.**	52,948	172	14,237	296	(7,914)	187	7,277	212	1,7
159	170	**Beard Co.**	52,826	168	15,333	262	(3,606)	151	16,865	145	6,5
160	164	**Wilshire Oil Co. of Texas**	52,293	213	7,256	302	(8.950)	168	10,906	177	3,6
161	215	**Leader Development Corp.[11,77]**	52,152	122	47,876	77	1,325	144	19,181	151	5,9
162	167	**Galaxy Oil Co.[1]**	51,284	207	7,746	303	(8,961)	246	2,646	296	3
163	—	**AMAX Inc. (Oil & Gas Operations)**	50,000	132	34,000	50	[50]10,000	—	NA	207	[78]2,0
164	191	**Presidio Oil Co.[29]**	49,492	215	7,055	81	1,182	131	26,154	154	5,5
165	196	**Plains Resources Inc.**	48,913	194	9,724	185	(888)	153	16,107	126	9,5
166	174	**DI Industries Inc.[35,79]**	48,032	189	10,394	289	(6.757)	170	10,320	229	1,3
167	155	**Pend Oreille Oil & Gas Co.[80]**	47,788	144	24,817	65	[50]3,189	—	NA	308	3
168	185	**Fuel Resources Development Co.[70,81]**	43,174	208	7,688	161	(472)	140	21,050	180	3,2
169	171	**Patrick Petroleum Co.**	43,098	206	7,981	301	(8,812)	126	29,837	164	4,7
170	156	**Thermal Exploration Co.[82]**	42,223	252	3,470	279	(5,559)	353	(2,044)	106	15,1
171	182	**Fuel Resources Inc.[83]**	40,742	203	8,586	318	(13,823)	—	NA	146	6,4
172	179	**Maynard Oil Co.**	40,014	171	14,246	244	(2,710)	128	28,956	170	4,0
173	166	**Argo Petroleum Corp.[1]**	39,510	183	11,874	334	(20,968)	369	(36,060)	243	9
174	175	**May Energy Partners Ltd.**	38,006	170	14,681	292	(7,496)	139	22,259	188	2,9
175	162	**Walker Energy Partners**	37,962	167	15,358	345	(31,429)	160	[16]13,162	255	8
176	197	**Alexander Energy Corp.[35]**	37,131	210	7,606	113	73	152	16,459	176	3,6
177	193	**Devon Resource Investors**	36,976	202	8,617	184	(835)	129	[16]28,443	156	5,4
178	159	**American Quasar Petroleum Co.**	36,303	185	11,442	337	(24,126)	372	(87,122)	221	1,4
179	192	**Bogert Oil Co.[8]**	35,707	158	19,290	73	1,647	150	17,432	141	6,9
180	176	**Samson Energy Co.**	35,699	191	10,255	320	(14,144)	132	[16]25,358	147	6,4
181	—	**American Oil & Gas Corp.**	35,601	106	75,094	243	(2,661)	164	11,684	232	1,2
182	158	**Chapman Energy Inc.**	35,578	173	13,948	356	(45,408)	364	(15,021)	184	3,1
183	—	**Penn Virginia Resources Corp.[84]**	35,312	199	8,690	64	[50]3,268	—	NA	153	5,5
184	136	**Oxoco Inc.**	35,078	164	16,467	35	31,802	180	8,000	194	2,5
185	148	**Tipperary Corp.[8]**	34,722	140	27,197	364	(58,085)	368	(34,203)	182	3,2
186	165	**ConVest Energy Partners Ltd.**	34,491	177	13,208	336	(23,702)	142	[16]19,657	203	2,2
187	200	**Calumet Industries Inc.[8]**	34,458	125	43,306	75	1,457	156	15,236	193	2,6
188	297	**Enex Resources Corp.[85]**	33,930	222	5,457	140	(212)	123	31,738	96	25,3
189	184	**Deminex U.S. Oil Co.**	33,782	166	16,189	288	(6,745)	178	8,381	183	3,2
190	217	**Plains Petroleum Co.**	32,923	175	13,558	63	3,588	155	15,692	208	1,9
191	—	**Nerco Oil & Gas Inc.[86]**	32,900	235	4,500	307	(10,500)	127	29,800	144	6,6
192	177	**LL&E Royalty Trust**	32,747	136	30,384	36	29,371	121	[68]32,747	—	N
193	188	**Energy Ventures Inc.**	32,564	231	4,743	85	871	143	19,564	349	
194	187	**Federated Natural Resources Corp.**	31,923	192	9,992	281	(5,777)	205	5,330	173	3,9
195	180	**Petroleum Investments Ltd.**	31,139	201	8,689	322	(14,770)	146	[16]18,945	209	1,9
196	195	**MacMillan Ring Free Oil Co. Inc.**	29,562	100	100,899	265	(3,823)	223	3,858	383	
197	205	**Equitable Petroleum Corp.**	29,296	245	3,971	171	(667)	188	7,079	235	1,2
198	—	**Kelley Oil & Gas Partners Ltd.[87]**	28,723	196	[88]9,008	80	[88]1,265	147	18,941	181	[88]3,2
199	208	**Petroleum Development Corp.**	28,639	182	12,236	106	213	173	9,512	251	88
200	—	**Quadra Oil & Gas Inc.[8,89]**	28,269	295	1,386	218	[29](1,613)	—	NA	—	N
201	—	**Saxon Oil Development Partners L.P.[90]**	28,236	181	12,369	259	(3,332)	138	[16]22,403	227	1,3
202	168	**McFarland Energy Inc.**	28,133	187	11,027	319	(14,143)	137	23,533	179	3,2
203	186	**KenCope Energy Cos.[29]**	27,582	155	20,737	295	(7,845)	145	19,065	142	6,8
204	190	**Midland SouthWest Corp.[91]**	27,035	162	18,091	325	(15,926)	133	25,112	137	7,2

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Worldwide liquids production		Worldwide natural gas production		Worldwide liquids reserves		Worldwide natural gas reserves		U.S. liquids production		U.S. natural gas production		U.S. liquids reserves		U.S. natural gas reserves		U.S. net wells drilled	
nk	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Wells
23	0.493	148	2.892	119	3.938	186	13.34	118	0.493	147	2.892	113	3.938	182	13.34	207	1.55
83	1.246	110	5.873	114	4.352	144	32.82	76	1.246	103	5.873	108	4.352	138	32.82	275	0.42
45	0.294	108	5.900	158	1.700	125	49.40	—	—	—	—	165	1.377	146	28.65	—	NA
25	0.468	113	5.645	139	2.780	140	36.23	121	0.468	106	5.645	132	2.780	134	36.23	164	3.10
53	0.046	159	2.537	229	0.491	120	53.53	260	0.046	157	2.537	227	0.491	112	53.53	160	3.26
26	0.464	154	2.678	133	2.924	173	17.06	122	0.464	152	2.678	128	2.924	169	17.06	79	14.76
58	0.222	168	1.948	143	2.636	146	32.10	175	0.157	180	1.337	160	1.539	177	15.14	165	3.10
12	0.094	170	1.853	248	0.357	183	15.06	208	0.094	167	1.853	246	0.357	179	15.06	48	35.32
55	0.237	211	0.827	117	4.195	126	45.52	153	0.237	206	0.827	111	4.195	120	45.52	184	2.18
73	0.188	89	10.12	195	0.926	99	86.57	172	0.168	125	4.197	206	0.712	167	17.61	286	0.30
24	0.081	176	1.568	209	0.697	142	35.22	220	0.081	172	1.568	207	0.697	136	35.22	76	17.03
58	0.199	147	2.905	208	0.730	152	28.21	164	0.199	146	2.905	205	0.730	147	28.21	218	1.29
90	0.027	214	0.750	281	0.193	228	5.546	287	0.027	210	0.750	279	0.193	226	5.546	271	0.47
29	0.431	95	7.907	178	1.267	154	27.80	126	0.431	88	7.907	176	1.267	149	27.80	252	0.75
32	0.076	157	2.593	211	0.684	94	103.2	229	0.076	155	2.593	209	0.684	86	103.2	98	10.40
94	0.128	243	0.351	204	0.798	281	2.090	191	0.128	240	0.351	200	0.798	279	2.090	145	3.91
38	0.065	224	0.526	224	0.552	188	12.51	235	0.065	221	0.526	222	0.552	185	12.51	—	NA
52	0.053	180	1.483	254	0.308	178	15.81	249	0.053	176	1.483	252	0.308	174	15.81	—	NA
34	0.394	161	2.114	172	1.309	170	20.03	132	0.394	159	2.114	169	1.309	165	20.03	174	2.84
18	0.560	171	1.828	66	12.79	116	60.40	112	0.560	194	1.124	57	12.79	119	48.77	—	—
32	0.402	133	3.767	179	1.213	161	23.53	130	0.402	131	3.767	177	1.213	157	23.53	196	1.93
72	0.189	124	4.775	166	1.461	141	35.71	168	0.189	120	4.775	162	1.461	135	35.71	303	0.10
16	0.090	164	2.005	175	1.285	159	24.16	212	0.090	162	2.005	172	1.285	155	24.16	144	3.97
25	0.081	152	2.787	216	0.660	145	32.39	221	0.081	151	2.787	214	0.660	139	32.39	236	0.95
46	0.275	149	2.853	168	1.401	176	16.91	142	0.275	148	2.853	164	1.401	172	16.91	277	0.40
69	0.193	123	4.818	207	0.777	153	28.14	165	0.193	119	4.818	204	0.777	148	28.14	70	21.00
64	0.046	131	3.927	277	0.202	156	25.54	261	0.046	129	3.927	275	0.202	152	25.54	193	1.97
45	0.009	280	0.157	360	0.025	316	0.910	343	0.009	277	0.157	359	0.025	314	0.910	—	—
65	0.205	167	1.958	213	0.669	191	11.72	161	0.205	165	1.958	211	0.669	188	11.72	172	2.90
11	0.018	165	2.000	271	0.237	135	41.00	308	0.018	163	2.000	269	0.237	128	41.00	77	17.00
51	0.249	138	3.595	198	0.874	167	20.71	148	0.249	136	3.595	194	0.874	162	20.71	264	0.57
27	0.456	174	1.586	124	3.599	157	24.80	123	0.456	170	1.586	116	3.599	153	24.80	231	1.00
35	0.391	163	2.028	135	2.868	166	21.74	133	0.391	161	2.028	130	2.868	161	21.74	204	1.69
40	0.065	—	—	287	0.177	—	—	237	0.065	—	—	285	0.177	—	—	—	—
96	0.123	193	1.219	193	0.955	175	16.95	193	0.123	187	1.219	190	0.955	171	16.95	—	NA
03	0.719	135	3.669	100	6.200	160	23.75	98	0.719	134	3.669	94	6.200	156	23.75	134	5.00
77	0.035	68	15.83	231	0.478	52	346.2	274	0.035	63	15.83	229	0.478	46	346.2	95	11.00
81	0.153	187	1.327	215	0.661	208	8.819	178	0.153	181	1.327	213	0.661	204	8.819	—	NA
85	1.167	145	3.036	147	2.236	190	12.12	78	1.167	143	3.036	140	2.236	187	12.12	199	1.80
05	0.020	184	1.383	282	0.187	211	8.129	302	0.020	178	1.383	280	0.187	208	8.129	—	—
59	0.221	177	1.545	218	0.655	202	9.650	156	0.221	173	1.545	216	0.655	198	9.650	208	1.54
82	0.149	139	3.469	203	0.825	158	24.56	179	0.149	137	3.469	199	0.825	154	24.56	161	3.19
84	0.144	—	—	332	0.075	—	—	181	0.144	—	—	331	0.075	—	—	—	—
88	0.136	223	0.539	118	3.943	149	29.91	185	0.136	220	0.539	112	3.943	142	29.91	142	4.00
51	**0.054	126	**4.589	236	0.433	112	68.80	248	**0.054	123	**4.589	234	0.433	103	68.80	214	**1.34
86	0.029	222	0.597	285	0.181	165	21.75	283	0.029	218	0.597	283	0.181	160	21.75	166	3.05
54	0.050	244	0.350	270	0.238	243	3.897	251	0.050	241	0.350	268	0.238	241	3.897	—	NA
14	0.569	169	1.875	112	4.707	177	16.01	108	0.569	166	1.875	106	4.707	173	16.01	291	0.20
06	0.659	191	1.279	94	6.826	234	5.172	100	0.659	185	1.279	87	6.826	232	5.172	188	2.00
39	0.065	208	0.877	262	0.272	220	6.942	236	0.065	203	0.877	260	0.272	217	6.942	140	4.41
60	0.048	225	0.512	261	0.282	205	9.204	257	0.048	222	0.512	259	0.282	201	9.204	223	1.14

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Rank by total assets 1986	Rank by total assets 1985	Company	Total assets $000	Total revenue Rank	Total revenue $000	Net income Rank	Net income $000	Stockholders' equity Rank	Stockholders' equity $000	Capital spe Rank
205	194	MSR Exploration Ltd.[92]	26,361	236	4,461	148	(276)	148	18,879	215
206	—	Fidelity Oil Co.	23,510	180	12,436	54	7,718	141	20,209	—
207	—	Coho Resources Inc.[93]	23,451	324	869	158	(397)	273	1,406	204
208	—	ZIM Energy Corp.[11]	23,255	242	[94]4,204	275	[94](4,785)	214	4,734	136
209	206	Baruch-Foster Corp.	22,494	204	8,193	270	(4,074)	161	13,105	198
210	213	Tucker Drilling Co. Inc.[35]	21,841	153	21,663	233	(2,220)	149	18,619	186
211	204	Belden & Blake Energy Co.	20,322	211	7,605	308	(10,798)	167	[18]11,164	128
212	243	Oregon Natural Gas Development Corp.[95]	20,236	190	10,388	183	(833)	169	10,758	157
213	229	Brock Exploration Corp.[35]	20,119	200	8,690	76	1,389	177	8,429	220
214	219	Ratex Resources Inc.[8]	18,392	240	4,309	268	(3,921)	362	(10,165)	278
215	232	Resource Exploration Inc.[8]	18,303	212	7,307	89	821	158	14,900	197
216	230	Hershey Oil Co.	18,243	227	5,038	250	(3,012)	159	13,331	178
217	233	Nugget Oil Corp.[96]	17,742	255	3,182	247	(2,763)	345	(699)	244
218	—	Taurus Exploration Inc.[8,97]	17,363	205	8,163	236	(2,422)	181	7,924	140
219	269	Great American Partners	17,062	267	2,522	284	(6,270)	163	[18]12,620	117
220	226	Lomak Petroleum Inc.	16,378	186	11,155	207	[illegible]	333	101	192
221	238	Sabine Royalty Trust	15,751	150	22,565	41	20,797	157	[68]15,122	—
222	255	Swift Energy Co.	15,731	225	5,073	82	1,109	192	6,617	236
223	216	Adams Resources & Energy Inc.	15,485	108	67,031	70	1,964	358	(6,223)	231
224	160	Magic Circle Energy Corp.[98]	15,209	174	13,596	94	546	239	2,858	195
225	248	Barrett Resources Corp.[8]	14,759	234	4,516	241	(2,622)	183	7,898	222
226	253	Kimbark Oil & Gas Co.	14,108	230	4,781	260	(3,442)	228	3,341	191
227	202	Trinity Resources Ltd.	13,885	223	5,413	326	(16,351)	198	6,015	234
228	228	Saxon Oil Co.	13,727	237	4,453	220	(1,755)	165	11,556	298
229	260	Oakridge Energy Inc.[99]	13,429	254	3,183	186	(890)	233	3,027	190
230	258	Michigan Oil Co.[100]	13,204	217	6,639	248	(2,850)	—	NA	139
231	244	Premier Resources Ltd.[8]	13,069	247	3,863	230	(2,131)	350	(1,625)	248
232	218	Petrominerals Corp.[101]	12,879	188	10,456	276	(4,843)	182	7,914	218
233	242	Bellwether Exploration Co.	12,856	246	3,892	271	(4,093)	243	2,787	219
234	198	Royal Resources Corp.[29,102]	12,761	241	4,303	324	(15,023)	166	11,364	189
235	239	Home-Stake Royalty Corp.	12,632	221	6,018	238	(2,534)	171	10,109	205
236	285	Evergreen Resources Inc.[35]	12,477	280	1,859	167	(557)	189	6,977	165
237	252	Seahawk Oil International Inc.	12,013	282	1,818	269	(3,954)	207	5,262	281
238	261	Vermillion Bay Land Co.[35]	11,909	228	5,033	83	1,094	172	9,804	199
239	—	Energy Management Corp.	11,293	216	6,858	258	(3,257)	212	4,832	200
240	247	Norris Oil Co.[29]	11,220	320	[103]917	280	[103](5,762)	179	8,343	237
241	249	Sage Drilling Co. Inc.[29]	11,049	214	7,224	181	(801)	191	6,860	271
242	231	Summit Energy Inc.[104]	10,897	233	4,528	310	(11,019)	206	5,323	226
243	275	Energy Assets International Corp.[35]	10,889	197	8,994	93	688	216	4,604	260
244	270	Geodyne Resources Inc.[105]	10,806	248	3,855	129	(92)	255	2,219	323
245	286	Dorchester Hugoton Ltd.	10,524	265	2,576	86	845	175	[18]8,731	196
246	245	ConVest Energy Corp.[106]	10,507	268	2,473	255	(3,124)	208	5,204	301
247	236	Arapaho Petroleum Inc.	10,497	276	2,031	299	(8,392)	290	981	265
248	266	Newhall Resources	10,142	193	9,737	72	1,923	176	[18]8,569	295
249	276	Thor Energy Resources Inc.[11]	10,001	218	6,407	146	(267)	196	6,286	258
250	287	Cobb Resources Corp.[29]	9,859	243	4,132	104	261	193	6,564	187
251	225	Texon Energy Corp.[96]	9,795	308	1,184	286	(6,567)	285	1,140	239
252	273	Striker Petroleum Corp.	9,583	291	1,459	225	(1,942)	185	7,513	292
253	366	Belcor Inc.[107]	9,458	195	9,484	87	833	241	2,832	293
254	264	Permian Basin Royalty Trust	9,359	137	28,656	37	28,154	184	[68]7,881	—
255	263	Dietrich Resources Corp.[18]	9,164	262	2,746	251	(3,030)	232	3,041	214

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Expl. ng — $000	Worldwide liquids production		Worldwide natural gas production		Worldwide liquids reserves		Worldwide natural gas reserves		U.S. liquids production		U.S. natural gas production		U.S. liquids reserves		U.S. natural gas reserves		U.S. net wells drilled	
	nk	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Wells
1,6	74	0.176	262	0.232	128	3.292	236	4.677	169	0.176	259	0.232	121	3.292	234	4.677	232	1.00
	79	1.308	—	—	71	11.80	—	—	72	1.308	—	—	62	11.80	—	—	168	3.00
2,1	93	0.130	—	—	64	13.85	293	1.707	190	0.130	—	—	55	13.85	290	1.707	154	3.63
[94]7,4	07	[94]0.099	190	[94]1.282	243	0.403	171	18.06	203	[94]0.099	184	[94]1.282	241	0.403	166	18.06	298	[94]0.13
2,4	33	0.398	181	1.470	129	3.099	187	13.19	131	0.398	177	1.470	122	3.099	183	13.19	181	2.29
2,9	04	0.101	234	0.456	297	0.154	298	1.489	201	0.101	230	0.456	295	0.154	295	1.489	125	5.50
9,0	52	0.247	178	1.540	146	2.444	174	17.04	149	0.247	174	1.540	139	2.444	170	17.04	173	2.90
5,1	—	NA	251	0.312	—	NA	310	1.099	—	NA	248	0.312	—	NA	308	1.099	233	1.00
1,4	02	0.106	189	1.292	230	0.483	210	8.295	199	0.106	183	1.292	228	0.483	207	8.295	213	1.35
5	35	0.072	188	1.296	155	1.781	195	10.53	232	0.072	182	1.296	150	1.781	192	10.53	81	14.44
2,5	42	0.064	179	1.503	267	0.251	193	11.13	239	0.064	175	1.503	265	0.251	190	11.13	116	6.30
3,3	97	0.113	183	1.394	181	1.138	133	42.39	197	0.107	219	0.589	189	0.970	260	2.925	243	0.86
9	285	0.029	204	0.965	235	0.436	184	14.58	282	0.029	199	0.965	233	0.436	180	14.58	149	3.84
7,0	179	0.157	166	1.984	232	[30]0.446	192	[30]11.71	176	0.157	164	1.984	230	[30]0.446	189	[30]11.71	—	NA
12,1	227	0.079	226	0.504	162	1.584	219	6.950	223	0.079	223	0.504	157	1.584	216	6.950	—	—
2,6	312	0.017	239	0.411	302	0.142	248	3.513	309	0.017	236	0.411	300	0.142	246	3.513	105	8.50
	99	0.835	119	5.388	97	6.465	132	42.44	94	0.835	113	5.388	90	6.465	126	42.44	—	NA
1,1	258	0.048	294	0.123	238	0.425	287	1.903	255	0.048	291	0.123	236	0.425	285	1.903	234	1.00
1,2	221	0.090	210	0.856	260	0.284	252	3.319	217	0.090	205	0.856	258	0.284	250	3.319	205	1.61
2,5	175	0.170	172	1.619	140	2.716	130	43.31	170	0.170	168	1.619	133	2.716	123	43.31	136	4.98
1,4	219	0.090	229	0.487	237	0.425	203	9.596	215	0.090	226	0.487	235	0.425	199	9.596	209	1.52
2,7	183	0.148	197	1.161	222	0.601	189	12.21	180	0.148	191	1.161	220	0.601	186	12.21	255	0.65
1,2	164	0.211	192	1.266	210	0.688	227	5.548	160	0.211	186	1.266	208	0.688	225	5.548	200	1.80
3	171	0.189	221	0.610	161	1.627	233	5.254	167	0.189	217	0.610	156	1.627	231	5.254	292	0.20
2,8	297	0.025	209	0.867	314	0.120	194	10.96	294	0.025	204	0.867	312	0.120	191	10.96	124	5.55
7,0	189	0.136	186	1.335	190	1.022	197	10.32	189	0.132	198	0.978	188	0.994	206	8.544	101	9.39
9	205	0.099	182	1.452	189	1.047	181	15.32	314	0.016	215	0.677	325	0.087	212	7.647	296	0.16
1,5	149	0.253	357	0.028	142	2.664	382	0.002	146	0.253	355	0.028	135	2.664	382	0.002	189	2.00
1,5	218	0.090	213	0.763	228	0.495	204	9.357	214	0.090	209	0.763	226	0.495	200	9.357	130	5.10
2,8	215	0.092	217	0.717	264	0.260	231	5.394	211	0.092	213	0.717	262	0.260	229	5.394	147	3.87
2,1	156	0.235	200	1.074	180	1.146	206	8.954	154	0.235	195	1.074	178	1.146	202	8.954	156	3.49
4,5	241	0.064	286	0.138	149	2.084	224	6.089	238	0.064	283	0.138	143	2.084	221	6.089	247	0.83
56	237	0.065	263	0.230	152	1.879	230	5.436	234	0.065	260	0.230	147	1.879	228	5.436	250	0.76
2,3	203	0.103	235	0.453	188	1.055	223	6.138	200	0.103	231	0.453	185	1.055	220	6.138	197	1.92
2,3	217	0.090	175	1.579	221	0.607	185	14.47	213	0.090	171	1.579	219	0.607	181	14.47	305	0.08
[3]1,1	280	[103]0.033	320	[103]0.086	164	1.543	169	20.39	277	[103]0.033	318	[103]0.086	159	1.543	164	20.39	—	—
65	306	0.020	269	0.198	315	0.115	308	1.132	303	0.020	266	0.198	313	0.115	306	1.132	180	2.36
1,3	185	0.143	199	1.125	176	1.284	198	10.21	182	0.143	193	1.125	173	1.284	194	10.21	300	0.12
75	178	0.160	230	0.481	255	0.299	240	4.041	174	0.160	227	0.481	253	0.299	238	4.041	—	—
1	328	0.014	245	0.347	334	0.075	229	5.529	326	0.014	242	0.347	333	0.075	227	5.529	314	0.02
2,5	—	—	105	6.801	—	—	80	139.7	—	—	98	6.801	—	—	70	139.7	—	—
34	243	0.062	240	0.394	239	0.416	242	3.898	240	0.062	237	0.394	237	0.416	240	3.898	285	0.32
67	261	0.047	232	0.459	225	0.529	217	7.148	258	0.047	232	0.446	224	0.526	224	5.918	312	0.03
40	176	0.169	151	2.796	194	0.930	179	15.69	171	0.169	150	2.796	191	0.930	175	15.69	248	0.81
77	331	0.013	295	0.123	286	0.178	318	0.840	329	0.013	292	0.123	284	0.178	316	0.840	270	0.48
2,98	201	0.106	272	0.184	154	1.831	261	2.963	198	0.106	269	0.184	149	1.831	258	2.963	187	2.12
1,06	191	0.134	196	1.174	276	0.202	215	7.635	187	0.134	190	1.174	274	0.202	213	7.635	135	5.00
43	208	0.098	354	0.033	115	4.209	360	0.160	204	0.098	352	0.033	109	4.209	359	0.160	129	5.25
42	327	0.014	384	0.001	327	0.083	—	—	325	0.014	383	0.001	326	0.083	—	—	—	—
N	77	1.360	127	4.338	59	18.51	121	52.88	70	1.360	124	4.338	47	18.51	114	52.88	—	NA
1,73	226	0.081	238	0.415	219	0.654	265	2.839	222	0.081	235	0.415	217	0.654	263	2.839	195	1.95

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Rank by total assets 1986	Rank by total assets 1985	Company	Total assets $000	Total revenue Rank	Total revenue $000	Net income Rank	Net income $000	Stockholders' equity Rank	Stockholders' equity $000	Capital & Ex spending Rank
256	221	**Western Energy Development Co. Inc.**[108]	9,082	297	1,369	274	(4,744)	361	(9,812)	331
257	223	**Basic Earth Science Systems Inc.**[35]	9,079	220	6,259	305	(9,231)	225	3,738	217
258	246	**Home-Stake Oil & Gas Co.**	8,429	226	5,042	252	(3,042)	195	6,308	213
259	298	**QED Exploration Inc.**[104]	8,353	261	2,764	95	518	197	6,159	206
260	—	**Com-Tek Resources Inc.**[8]	8,334	312	1,103	156	(374)	209	5,151	311
261	259	**Pyramid Oil Co.**	8,320	224	5,388	66	2,997	186	7,353	250
262	283	**Amcole Energy Corp.**[29]	8,035	229	4,799	176	(747)	292	941	228
263	256	**Usenco Inc.**[107]	8,028	259	2,807	216	(1,559)	242	2,805	233
264	282	**Golden Oil Co.**[29]	8,011	266	2,574	139	(207)	210	5,028	302
265	272	**Burkhart Petroleum Corp.**	7,754	260	2,765	253	(3,055)	351	(1,754)	262
266	234	**Jackson Exploration Inc.**	7,689	209	7,647	278	(5,493)	288	1,086	290
267	214	**Partners Oil Co.**	7,493	251	3,474	53	7,763	230	3,277	247
268	290	**Panhandle Royalty Co.**[8]	7,010	256	3,135	97	485	219	4,291	268
269	—	**Caseka Resources Ltd.**[58]	6,957	219	6,377	90	[109]797	—	NA	161
270	271	**Houston Oil Royalty Trust**	6,957	264	2,633	69	2,131	190	[68]6,957	—
271	280	**GeoResources Inc.**	6,950	272	2,259	234	(2,812)	221	4,054	269
272	265	**Petromark Resources Co.**	6,926	269	2,359	287	(6,708)	263	1,878	259
273	210	**Petroleum Reserve Corp.**[29,110]	6,879	232	4,664	293	(7,689)	315	452	230
274	268	**Petrotech Inc.**	6,868	258	2,934	273	(4,402)	355	(3,300)	306
275	312	**Intercontinental Energy Corp.**[8]	6,787	278	2,015	237	(2,433)	344	(615)	289
276	291	**Alta Energy Corp.**[29]	6,691	293	1,405	130	(94)	274	1,399	313
277	279	**Altex Industries Inc.**[8]	6,667	275	2,040	249	(2,905)	200	5,776	288
278	277	**Nahama & Weagant Energy Co.**[11]	6,625	298	1,365	266	(3,832)	217	4,460	224
279	302	**Bayou Resources Inc.**[111]	6,607	270	2,355	125	(45)	238	2,892	277
280	294	**Mustang Cos. Inc.**	6,493	253	3,229	327	(16,912)	199	5,969	261
281	—	**Castle Energy Corp.**[8]	6,382	250	[112]3,691	102	[112]311	295	803	245
282	262	**Strata Corp.**[113]	6,363	257	3,079	290	(7,113)	360	(9,753)	347
283	315	**Falcon Oil & Gas Co. Inc.**	6,270	310	1,124	103	287	215	4,648	240
284	295	**Credo Petroleum Corp.**[107]	6,143	326	850	179	(777)	201	5,775	316
285	303	**Prima Energy Corp.**[29]	6,139	283	1,807	110	112	203	5,350	314
286	305	**Whiting Petroleum Corp.**	6,045	274	2,107	107	201	204	5,338	273
287	332	**Black Gold Energy Resources Inc.**[35]	5,945	305	1,236	99	385	252	2,355	202
288	—	**Fountain Oil & Gas Inc.**[114]	5,848	304	1,244	217	(1,571)	289	1,015	172
289	317	**Wepco Energy Co.**	5,651	307	1,191	166	(553)	231	3,176	225
290	284	**Great Eastern Energy & Development Corp.**	5,609	290	1,499	88	828	220	4,271	282
291	293	**Gerber Energy International Inc.**	5,577	287	1,586	221	(1,834)	237	2,899	246
292	299	**Peninsula Resources Corp.**	5,507	277	2,020	256	(3,126)	366	(18,475)	353
293	—	**Valex Petroleum Inc.**	5,360	292	1,421	141	(220)	224	3,786	332
294	241	**Monogram Oil & Gas Inc.**[107]	5,171	285	1,700	315	(12,449)	356	(4,683)	378
295	—	**Kelley Oil Corp.**	4,999	244	4,082	155	(357)	251	2,371	252
296	318	**Burton-Hawks Inc.**	4,966	271	2,286	174	(699)	247	2,623	315
297	—	**Wexco of Delaware Inc.**[115]	4,960	318	990	165	[116](550)	222	3,892	241
298	310	**Dallas Oil & Minerals Inc.**	4,889	314	1,015	169	(585)	213	4,821	223
299	307	**K.R.M. Petroleum Corp.**	4,881	279	1,957	204	(1,274)	262	1,895	300
300	308	**Parallel Petroleum Corp.**	4,737	329	773	227	(2,036)	227	3,374	253
301	289	**Greenwood Resources Inc.**	4,676	317	994	235	(2,329)	338	(98)	335
302	300	**Henry Energy Corp.**[29]	4,531	238	4,393	224	(1,897)	250	2,411	216
303	—	**Paloma Petroleum Ltd.**[58]	4,492	385	201	200	(1,154)	218	4,359	386
304	330	**Energy Capital Development Corp.**	4,415	362	375	182	(804)	266	1,703	249
305	325	**NP Energy Corp.**[35]	4,244	345	593	128	(80)	277	1,299	321
306	274	**Oxford Consolidated Inc.**[35,118]	4,221	273	2,233	297	(8,192)	268	1,633	185

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dwide uids uction Mill bbl	Worldwide natural gas production Rank	Worldwide natural gas production Bcf	Worldwide liquids reserves Rank	Worldwide liquids reserves Mill bbl	Worldwide natural gas reserves Rank	Worldwide natural gas reserves Bcf	U.S. liquids production Rank	U.S. liquids production Mill bbl	U.S. natural gas production Rank	U.S. natural gas production Bcf	U.S. liquids reserves Rank	U.S. liquids reserves Mill bbl	U.S. natural gas reserves Rank	U.S. natural gas reserves Bcf	U.S. net wells drilled Rank	U.S. net wells drilled Wells
0.111	318	0.089	170	1.326	270	2.598	194	0.111	316	0.089	167	1.326	268	2.598	—	—
0.135	267	0.218	187	1.072	246	3.687	186	0.135	264	0.218	184	1.072	244	3.687	224	1.13
0.211	205	0.949	191	1.020	213	7.951	159	0.211	200	0.949	186	1.020	210	7.951	162	3.11
0.092	256	0.283	242	0.405	271	2.559	210	0.092	253	0.283	240	0.405	269	2.559	103	9.18
0.048	329	0.074	174	1.290	226	5.935	253	0.048	327	0.074	171	1.290	223	5.935	—	—
0.132	347	0.037	182	1.124	333	0.506	188	0.132	345	0.037	179	1.124	331	0.506	143	4.00
0.016	277	0.168	313	0.121	238	4.336	312	0.016	274	0.168	311	0.121	236	4.336	—	—
0.095	279	0.158	148	2.091	247	3.587	206	0.095	276	0.158	142	2.091	245	3.587	117	6.30
0.074	253	0.302	165	1.515	275	2.359	230	0.074	250	0.302	161	1.515	273	2.359	183	2.20
0.059	248	0.323	252	0.321	256	3.110	242	0.059	245	0.323	250	0.321	254	3.110	242	0.88
0.078	246	0.330	233	0.443	279	2.138	226	0.078	243	0.330	231	0.443	277	2.138	—	—
0.073	236	0.438	350	0.047	327	0.598	231	0.073	233	0.438	349	0.047	325	0.598	311	0.04
0.059	207	0.891	274	0.219	216	7.188	243	0.059	202	0.891	272	0.219	214	7.188	268	0.50
0.250	195	1.201	192	0.999	259	3.000	147	0.250	189	1.201	187	0.999	257	3.000	112	8.00
0.027	216	0.734	284	0.184	237	4.417	288	0.027	212	0.734	282	0.184	235	4.417	—	—
0.096	349	0.035	202	0.827	359	0.173	205	0.096	347	0.035	198	0.827	358	0.173	190	2.00
0.099	237	0.416	220	0.629	267	2.690	202	0.099	234	0.416	218	0.629	265	2.690	179	2.49
0.165	203	0.982	197	0.889	232	5.294	173	0.165	197	0.982	193	0.889	230	5.294	59	25.00
0.124	247	0.327	214	0.665	257	3.044	192	0.124	244	0.327	212	0.665	255	3.044	257	0.64
0.044	299	0.116	321	0.106	329	0.594	263	0.044	297	0.116	319	0.106	327	0.594	—	—
0.032	293	0.125	249	0.342	222	6.169	278	0.032	290	0.125	247	0.342	219	6.169	259	0.62
0.047	336	0.058	303	0.141	361	0.143	259	0.047	334	0.058	301	0.141	360	0.143	293	0.20
0.015	250	0.312	244	0.403	251	3.339	319	0.015	247	0.312	242	0.403	249	3.339	221	1.20
0.048	201	1.044	259	0.287	196	10.49	256	0.048	196	1.044	257	0.287	193	10.49	263	0.58
0.021	255	0.283	301	0.143	258	3.029	300	0.021	252	0.283	299	0.143	256	3.029	131	5.09
[112]0.050	231	[112]0.476	293	0.163	245	3.759	252	[112]0.050	228	[112]0.476	291	0.163	243	3.759	176	[112]2.75
0.037	227	0.499	278	0.196	249	3.508	271	0.037	224	0.499	276	0.196	247	3.508	—	—
0.022	257	0.263	290	0.171	182	15.11	297	0.022	254	0.263	288	0.171	178	15.11	—	—
0.016	346	0.040	356	0.030	300	1.355	318	0.016	344	0.040	355	0.030	298	1.355	238	0.94
0.011	311	0.101	362	0.022	301	1.340	338	0.011	309	0.101	361	0.022	299	1.340	229	1.04
0.046	287	0.133	289	0.172	274	2.385	262	0.046	284	0.133	287	0.172	272	2.385	—	—
0.031	291	0.129	186	1.085	209	8.737	280	0.031	288	0.129	183	1.085	205	8.737	102	9.22
0.040	270	0.193	227	0.501	280	2.121	266	0.040	267	0.193	225	0.501	278	2.121	—	NA
0.021	258	0.259	253	0.316	272	2.505	299	0.021	255	0.259	251	0.316	270	2.505	306	0.07
0.061	305	0.106	291	0.168	325	0.653	241	0.061	303	0.106	289	0.168	323	0.653	126	5.45
0.039	298	0.118	226	0.529	317	0.905	268	0.039	296	0.118	223	0.529	315	0.905	278	0.38
0.009	333	0.065	—	—	—	—	346	0.009	331	0.065	—	—	—	—	256	0.65
0.055	265	0.220	171	1.320	263	2.924	247	0.055	262	0.220	168	1.320	261	2.924	—	—
0.019	228	0.488	336	0.072	255	3.144	307	0.019	225	0.488	335	0.072	253	3.144	313	0.03
0.007	233	0.457	347	0.050	214	7.649	353	0.007	229	0.457	346	0.050	211	7.649	244	0.84
0.056	316	0.090	199	0.854	264	2.840	246	0.056	314	0.090	195	0.854	262	2.840	273	0.46
0.034	282	0.149	312	0.122	304	1.270	276	0.034	279	0.149	310	0.122	302	1.270	227	1.05
0.021	261	0.234	319	0.109	292	1.728	301	0.021	258	0.234	317	0.109	289	1.728	239	0.94
0.084	254	0.284	240	0.414	225	6.054	219	0.084	251	0.284	238	0.414	222	6.054	202	1.72
0.019	275	0.174	266	0.256	283	2.026	305	0.019	272	0.174	264	0.256	281	2.026	206	1.59
0.032	252	0.310	295	0.161	286	1.964	279	0.032	249	0.310	293	0.161	284	1.964	310	0.04
0.078	341	0.044	279	0.194	350	0.294	228	0.078	339	0.044	277	0.194	34[illegible]	0.294	137	4.97
[117]0.009	353	[117]0.033	373	[117]0.013	354	[117]0.233	345	[117]0.009	351	[117]0.033	373	[117]0.013	353	[117]0.233	—	NA
0.006	323	0.079	245	0.390	199	10.14	354	0.006	321	0.079	243	0.390	195	10.14	—	—
0.001	283	0.145	324	0.100	221	6.501	377	0.001	280	0.145	322	0.100	218	6.501	—	NA
0.071	242	0.354	241	0.410	266	2.813	233	0.071	239	0.354	239	0.410	264	2.813	128	5.37

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Rank by total assets 1986	Rank by total assets 1985	Company	Total assets $000	Total revenue Rank	Total revenue $000	Net income Rank	Net income $000	Stockholders' equity Rank	Stockholders' equity $000	Capital & Expl. spending Rank
307	—	**Twin Richfield Oils Inc.[119]**	3,928	364	362	120	(26)	259	2,068	356
308	346	**Arch Petroleum Inc.**	3,731	309	1,137	211	(1,452)	276	1,323	338
309	—	**Republic Resources Corp.**	3,601	327	[120]787	201	[120](1,205)	272	1,452	346
310	358	**Roseland Oil & Gas Inc.[121]**	3,570	299	1,316	98	396	281	1,183	267
311	—	**Normandy Oil & Gas Co. Inc.[29]**	3,545	281	1,858	229	(2,072)	245	2,668	264
312	335	**Southern Mineral Corp.**	3,505	284	1,762	100	315	240	2,835	254
313	321	**Tyrex Oil Co.[29]**	3,433	347	585	187	(890)	226	3,422	256
314	313	**Columbine Exploration Corp.[70]**	3,417	302	1,270	202	(1,222)	349	(1,176)	324
315	340	**Crescent Oil & Gas Corp.[8]**	3,361	367	329	154	(356)	235	2,990	320
316	343	**Aspen Exploration Corp.[29]**	3,295	316	1,011	138	(190)	236	2,961	337
317	326	**Lyric Energy Inc.[98]**	3,215	348	577	195	(985).	298	733	354
318	345	**Plano Petroleum Corp.[8]**	3,063	338	653	145	(258)	234	3,001	294
319	316	**Roberts Oil & Gas Inc.[18]**	3,006	343	618	231	(2,134)	275	1,325	257
320	361	**Exploration Co.[23]**	2,934	361	379	205	(1,298)	257	2,103	274
321	—	**Ranger Oil Ltd.[58]**	2,927	249	3,799	192	(951)	—	NA	—
322	257	**Chaparral Resources Inc.[70]**	2,911	328	785	304	(9,095)	249	2,463	287
323	—	**Penn Pacific Corp.[8]**	2,891	349	556	214	(1,484)	354	(3,183)	384
324	337	**Pantepec International Inc.**	2,852	394	92	147	(267)	244	2,718	—
325	—	**Energy Resources of North Dakota Inc.[35]**	2,750	306	1,233	190	(936)	248	2,473	238
326	—	**Mineral Development Inc.[35,122]**	2,741	296	1,381	127	(50)	312	502	350
327	320	**Appalachian Oil & Gas Co. Inc.[29]**	2,705	368	[123]326	123	[123](37)	318	388	272
328	352	**Intramerican Oil & Minerals Inc.**	2,681	339	649	91	736	256	2,141	342
329	355	**Double Eagle Petroleum & Mining Co.[23]**	2,613	319	957	159	(397)	254	2,264	276
330	—	**Sierra Exploration Co.[124]**	2,598	286	1,640	291	(7,365)	346	(706)	325
331	254	**Seaxe Energy Corp.[125]**	2,590	391	113	313	(12,019)	264	1,800	297
332	342	**Nova Natural Resources Corp.[8,126]**	2,579	332	764	228	(2,061)	343	(536)	333
333	—	**Keldon Oil Co.[104]**	2,566	352	506	62	3,634	297	745	210
334	224	**Wichita Industries Inc.[124]**	2,510	288	1,554	283	(6,095)	308	524	263
335	—	**Pathfinder Petroleum Corp.[121]**	2,480	323	874	193	(963)	321	355	270
336	357	**Questa Oil & Gas Co.**	2,441	321	915	119	(16)	267	1,667	283
337	336	**Albion International Resources Inc.**	2,269	357	434	177	(747)	280	1,200	319
338	347	**Crown Resource Corp.**	2,256	351	541	215	(1,523)	258	2,100	279
339	—	**Castle Royalty Limited Partnership**	2,055	378	238	168	(562)	260	[18]2,008	380
340	—	**Western Energy Resources Inc.**	1,954	375	248	172	(689)	261	1,900	367
341	323	**Petrol Industries Inc.**	1,931	294	1,400	223	(1,864)	265	1,731	343
342	356	**Reef Energy Corp.**	1,925	303	1,264	157	(390)	313	495	284
343	367	**Willard Pease Oil & Gas Co.**	1,888	333	707	142	(236)	304	643	341
344	363	**Sunbelt Exploration Inc.[23]**	1,717	355	451	151	(326)	284	1,147	368
345	365	**Impact Energy Inc**	1,657	377	240	164	(508)	269	1,633	385
346	—	**Taurus Petroleum Inc.[8]**	1,646	341	629	153	(354)	303	648	339
347	371	**Big Piney Oil & Gas Co.**	1,641	384	206	126	(46)	270	1,540	340
348	341	**Reserve Exploration Co.[35]**	1,623	325	868	226	(2,009)	310	503	286
349	360	**Love Oil Co. Inc.[18]**	1,622	381	211	197	(1,071)	271	1,503	326
350	—	**International Royalty & Oil Co.[8]**	1,610	383	209	199	(1,123)	332	106	317
351	379	**Pioneer Oil & Gas Corp.[8]**	1,608	350	546	109	118	278	1,270	299
352	348	**Toklan Oil Corp.[23]**	1,534	311	1,111	212	(1,475)	293	903	307
353	324	**Midwest Exploration Inc.[8]**	1,490	337	665	232	(2,142)	339	(111)	330
354	329	**Eagle Exploration Co.[35]**	1,477	289	1,518	242	(2,633)	357	(5,243)	285
355	339	**Hubco Exploration Inc.**	1,432	334	704	209	(1,376)	342	(212)	334
356	364	**Wicklund Petroleum Corp.**	1,430	356	437	152	(345)	287	1,122	355
357	338	**Western Natural Gas Co.**	1,420	263	2,709	246	(2,759)	334	93	266

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ldwide uids luction—	Worldwide natural gas —production—		Worldwide liquids —reserves—		Worldwide natural gas —reserves—		U.S. liquids —production—		U.S. natural gas —production—		U.S. liquids —reserves—		U.S. natural gas —reserves—		U.S. net wells —drilled—	
Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Mill bbl	Rank	Bcf	Rank	Wells
—	297	0.119	—	—	285	1.966	—	—	295	0.119	—	—	283	1.966	283	0.33
0.037	273	0.180	325	0.098	313	1.008	273	0.037	270	0.180	323	0.098	311	1.008	304	0.10
[120]0.006	359	[120]0.027	370	0.015	363	0.138	357	[120]0.006	357	[120]0.027	369	0.015	362	0.138	—	—
0.028	296	0.120	292	0.167	338	0.444	285	0.028	293	0.120	290	0.167	336	0.444	—	NA
0.003	300	0.113	268	0.246	312	1.010	368	0.003	298	0.113	266	0.246	310	1.010	287	0.30
0.011	212	0.781	340	0.063	235	4.911	336	0.011	207	0.781	338	0.063	233	4.911	228	1.05
0.014	378	0.007	351	0.043	368	0.092	328	0.014	376	0.007	350	0.043	367	0.092	230	1.02
0.040	301	0.113	—	—	—	—	267	0.040	299	0.113	—	—	—	—	258	0.63
0.004	324	0.079	366	0.019	241	3.986	364	0.004	322	0.079	365	0.019	239	3.986	139	4.50
0.042	366	0.019	256	0.298	326	0.618	264	0.042	364	0.019	254	0.298	324	0.618	309	0.05
0.007	325	0.079	308	0.127	250	3.455	351	0.007	323	0.079	306	0.127	248	3.455	265	0.55
0.020	334	0.063	331	0.076	321	0.755	304	0.020	332	0.063	330	0.076	319	0.755	178	2.50
0.015	306	0.105	358	0.028	284	2.008	323	0.015	304	0.105	357	0.028	282	2.008	226	1.10
0.009	326	0.079	365	0.019	344	0.379	344	0.009	324	0.079	364	0.019	343	0.379	246	0.83
0.143	185	1.367	309	0.123	323	0.687	183	0.143	179	1.367	307	0.123	321	0.687	269	0.50
0.010	302	0.112	298	0.152	244	3.800	339	0.010	300	0.112	296	0.152	242	3.800	—	—
0.008	285	0.141	349	0.048	294	1.669	348	0.008	282	0.141	348	0.048	291	1.669	—	—
0.001	355	0.032	372	0.014	288	1.888	378	0.001	353	0.032	372	0.014	297	1.415	222	1.20
0.024	387	(s)	323	0.100	384	0.001	296	0.024	386	(s)	321	0.100	384	0.001	175	2.83
0.026	292	0.127	275	0.210	296	1.586	292	0.026	289	0.127	273	0.210	293	1.586	158	3.40
[123](s)	310	[123]0.103	385	0.001	201	9.825	388	[123](s)	308	[123]0.103	385	0.001	197	9.825	245	[123]0.83
0.015	266	0.219	283	0.186	277	2.250	321	0.015	263	0.219	281	0.186	275	2.250	—	—
0.039	330	0.071	265	0.257	305	1.195	269	0.039	328	0.071	263	0.257	303	1.195	210	1.51
0.090	281	0.152	257	0.295	295	1.660	216	0.090	278	0.152	255	0.295	292	1.660	—	—
0.001	362	0.025	288	0.177	254	3.215	375	0.001	360	0.025	286	0.177	252	3.215	—	—
0.019	331	0.070	294	0.163	330	0.544	306	0.019	329	0.070	292	0.163	328	0.544	—	—
0.009	363	0.024	250	0.326	289	1.805	340	0.009	361	0.024	248	0.326	286	1.805	—	NA
0.094	322	0.083	247	0.359	—	—	207	0.094	320	0.083	245	0.359	—	—	—	—
NA	—	NA	335	0.075	331	0.524	—	NA	—	NA	334	0.075	329	0.524	237	0.95
0.011	271	0.192	339	0.063	262	2.961	335	0.011	268	0.192	339	0.063	259	2.961	177	2.57
0.015	342	0.043	251	0.322	311	1.069	320	0.015	340	0.043	249	0.322	309	1.069	—	—
0.026	—	—	354	0.033	—	—	293	0.026	—	—	353	0.033	—	—	235	1.00
0.005	339	0.053	353	0.038	342	0.408	361	0.005	337	0.053	352	0.038	341	0.408	—	NA
0.005	315	0.092	299	0.144	290	1.751	360	0.005	313	0.092	297	0.144	287	1.751	—	—
0.088	370	0.017	99	6.401	339	0.431	218	0.088	368	0.017	93	6.401	337	0.431	—	—
0.029	278	0.165	320	[30]0.107	307	[30]1.152	284	0.029	275	0.165	318	[30]0.107	305	[30]1.152	280	0.38
0.037	327	0.075	258	0.288	273	2.458	270	0.037	325	0.075	256	0.288	271	2.458	261	0.61
(s)	304	0.110	387	0.001	302	1.319	386	(s)	302	0.110	387	0.001	300	1.319	—	—
0.012	—	—	317	0.112	—	—	333	0.012	—	—	315	0.112	—	—	—	—
0.009	274	0.175	326	0.095	299	1.459	342	0.009	271	0.175	324	0.095	296	1.459	—	—
—	317	0.090	—	—	282	[30]2.073	—	—	315	0.090	—	—	280	[30]2.073	—	—
0.034	344	0.041	272	0.232	357	0.197	275	0.034	342	0.041	270	0.232	356	0.197	253	0.69
0.006	382	0.003	371	0.014	381	0.010	358	0.006	381	0.003	370	0.014	381	0.010	294	0.20
0.001	373	0.014	381	[30]0.008	358	[30]0.187	381	0.001	371	0.014	381	[30]0.008	357	[30]0.187	—	—
0.001	—	—	311	0.123	278	2.212	376	0.001	—	—	309	0.123	276	2.212	191	2.00
0.016	249	0.316	330	0.077	315	0.925	316	0.016	246	0.316	329	0.077	313	0.925	240	0.91
0.026	314	0.096	246	0.383	320	0.779	291	0.026	312	0.096	244	0.383	318	0.779	288	0.30
0.042	290	0.130	348	0.049	352	0.239	265	0.042	287	0.130	347	0.049	351	0.239	217	1.30
0.028	309	0.104	333	0.075	322	0.717	286	0.028	307	0.104	332	0.075	320	0.717	—	—
0.004	284	0.144	344	0.053	309	1.131	362	0.004	281	0.144	343	0.053	307	1.131	299	0.13
0.011	268	0.201	352	0.041	349	0.297	337	0.011	265	0.201	351	0.041	348	0.297	249	0.77

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Rank by total assets 1986	Rank by total assets 1985	Company	Total assets $000	Total revenue Rank	Total revenue $000	Net income Rank	Net income $000	Stockholders' equity Rank	Stockholders' equity $000	Capital & Exp spending Rank	Capital & Exp spending $00
358	—	**Sheffield Exploration Co. Inc.**[29]	1,372	344	612	208	(1,372)	279	1,241	275	
359	376	**EMC Energies Inc.**[29]	1,366	336	667	135	(155)	301	667	312	
360	327	**Pangea Petroleum Co.**	1,365	313	1,083	173	(689)	322	332	345	
361	374	**Sharon Energy Ltd.**[35]	1,361	371	317	134	(125)	341	(142)	303	
362	306	**South Texas Drilling & Exploration Inc**	1,348	330	770	84	1,075	282	1,167	370	
363	—	**Carmel Energy Inc.**	1,292	322	875	188	(899)	328	215	291	
364	373	**Cheyenne Resources Inc.**	1,253	374	258	178	(758)	302	667	318	
365	—	**Bengal Oil & Gas Corp.**	1,240	372	291	198	(1,121)	337	(93)	322	
366	386	**Golden Triangle Royalty & Oil Inc.**	1,161	393	102	149	(318)	283	1,158	304	
367	—	**Comanche Oil Exploration Inc.**[35]	1,151	397	49	170	(611)	286	1,130	369	
368	381	**Bolyard Oil & Gas Ltd.**[98]	1,132	365	355	122	(31)	309	520	365	
369	382	**TPEX Exploration Inc.**[29]	1,110	331	766	112	109	306	549	327	
370	383	**Tri-Valley Corp.**[104]	1,085	346	591	114	27	311	503	310	
371	380	**Wyoming Oil & Minerals Inc.**[105]	1,073	382	211	136	(159)	314	489	373	
372	334	**Melton Drilling & Exploration Co.**	1,048	342	622	240	(2,571)	336	(82)	362	
373	333	**Circle Seven Oil & Gas Inc.**[18]	1,037	335	696	175	(721)	291	959	280	
374	368	**Oil City Petroleum Inc.**[23]	1,024	373	288	203	(1,224)	300	689	374	
375	349	**Hipoint Investments Ltd.**	932	353	475	219	(1,709)	367	(19,612)	348	
376	—	**Hughes Texas Petroleum Corp.**	866	369	324	115	18	316	406	352	
377	399	**Sterling Oil of Oklahoma Inc.**	856	379	225	118	(1)	294	838	357	
378	2F	**J.M. Resources Inc.**[29]	835	301	1,286	257	(3,150)	347	(732)	375	
379	—	**Tiber Resources Inc.**[128]	826	376	241	267	(3,847)	—	NA	377	
380	—	**United Western Energy Corp.**[121]	820	359	413	189	(920)	335	4	344	
381	375	**Yellowstone Resources Inc.**	762	387	165	191	(946)	296	754	329	
382	385	**Amacan Resources Corp.**[98]	742	360	396	144	(253)	299	713	366	
383	—	**Bowtex Energy (Canada) Corp.**[35,58]	717	386	188	131	(109)	—	NA	363	
384	—	**Bristol Oil & Gas Inc.**[29]	700	366	349	143	(239)	323	314	328	
385	—	**Noarko Resources Inc.**[8,124]	696	315	1,015	254	(3,104)	340	(112)	358	
386	—	**ORS Corp.**[107,129]	689	300	1,313	316	(13,088)	359	(9,607)	305	
387	395	**Texas Vanguard Oil Co.**	662	358	426	111	110	307	534	372	
388	370	**Diablo Oil Co.**[70,124]	656	370	320	210	(1,384)	324	306	351	
389	—	**Katy Energy Corp.**[19]	654	363	367	116	12	326	253	359	
390	—	**Crown Energy Corp.**[130]	573	399	1	121	(30)	305	572	381	
391	400	**Pan Energy Resources Inc.**[29]	501	340	630	96	486	317	404	379	
392	391	**Bronco Oil & Gas Co.**[8]	493	389	126	196	(1,054)	348	(1,153)	371	
393	351	**Kee Exploration Inc.**[124]	420	354	472	239	(2,546)	352	(1,871)	360	
394	388	**Score Exploration Corp.**[29]	405	388	128	163	(483)	319	387	167	4
395	—	**Five Star Energy Corp.**[29]	388	398	18	132	(112)	327	244	—	
396	—	**Croff Oil Co.**	385	390	121	124	(43)	329	215	361	
397	398	**Houston Oil & Energy Inc.**[29]	384	392	106	133	(112)	320	367	336	
398	389	**Amber Resources Co.**	313	380	225	162	(482)	325	276	376	
399	393	**Shaw Resources Inc.**[35]	151	396	71	160	(418)	331	144	309	
400	397	**Imperial Energy Corp.**[8]	149	395	84	150	(325)	330	145	364	
		Totals	495,345,856		422,268,155		5,201,456		173,875,414		44,032

NA = Not Available. (s) indicates less than 500 bbl or 500 mcf. Fiscal yearend is Dec. 31 unless otherwise noted. 1. Currently operating under Chapter 11. 2. Since fiscal yearend company has become a wholly owned subsidiary of British Petroleum Co. 3. Formerly listed as Marathon and Texas Oil & Gas. 4. Operating income before foreign income tax. 5. Subsidiary of E.I. du Pont de Nemours Co. 6. After tax operating income. 7. May include insignificant amounts in Canada. 8. Fiscal yearend Sept. 30. 9. Since fiscal yearend company has split into two separate companies—Maxus Corp. and Diamond Shamrock Refining & Marketing Corp. 10. Subsidiary of Burlington Northern Inc. 11. Fiscal yearend Jan. 31, 1987. 12. Formerly Champlin Petroleum. Subsidiary of Union Pacific Corp. 13. Includes both cost-of-service and non-cost-of-service properties. 14. Subsidiary of Goodyear Tire & Rubber Co. Since fiscal yearend Exxon has reached agreement with Goodyear to purchase Celeron. 15. Unocal owns 95% of partnership units. 16. Partner's capital. 17. Subsidiary of Broken Hill Proprietary Co. Ltd. 18. Fiscal yearend May 31. 19. Transco owns 71.5% of partnership units. 20. Enserch owns 86% of partnership units. 21. Subsidiary of W.R. Grace. 22. Identifiable assets. 23. Fiscal yearend Aug. 31. 24. Company holds oil and gas reserves within the U.S. but is not required to disclose them under Securities and Exchange Commission rules. 25. Subsidiary of Santa Fe Southern Pacific Corp. 26. Operating income. 27. Freeport-McMoRan owns 87.3% of partnership units. 28. General partnership owned equally by Union Texas and Ultramar. 29. Fiscal yearend June 30. 30. Proved developed reserves. 31. Apache owns 6.1% of partnership units. 32. Net savings.

33. Member and patron equities. 34. Subsidiary of Moore McCormack Resources Inc. 35. Fi
yearend March 31. 36. Based on a 1985 estimate. 37. Gas wells only. 38. Formerly listed as T
Gas Transmission. Subsidiary of CSX Corp. 39. Diamond Shamrock owns 80% of partnership u
40. Subsidiary of Houston Industries Inc. 41. Includes operating expenses for oil and gas operati
42. Santa Fe Energy owns 80% of partnership units. 43. Formerly Petro-Lewis Corp. 44. Previo
listed under parent company, Pacific Lighting Corp. 45. Defined net income including income ta
46. Net margins. 47. Capital stock and members' equity. 48. Mesa Limited Partnership owns 30
partnership units. 49. Subsidiary of DeKalb Corp. 50. Operating income before interest and inc
taxes. 51. Formerly Templeton Energy. 52. Subsidiary of Angeles Corp. 53. Subsidiary of Hi
Walker Resources Ltd. 54. Subsidiary of Consumers Power Co. 55. May include insignificant amo
in Australia. 56. Since fiscal yearend company has sold 95% of U.S. reserves. 57. Subsidiar
Placer Development Ltd. 58. U.S operations only. 59. Subsidiary of Southdown Inc. 60. Subsid
of Kaiser Aluminum & Chemical Corp. 61. Formerly Hadson Petroleum Corp. 62. Subsidiar
Homestake Mining Co. 63. Subsidiary of Cortez International Ltd. Company has assets and rese
but is not currently an operating entity, thus no revenues, income or production. 64. Subsidiary o
Group Inc. 65. Kaneb Services owns 80.5% of partnership units. 66. Figures are for the period f
creation on Feb. 7, 1986 through Dec. 31, 1986. 67. Since fiscal yearend company has b
purchased by Questar. 68. Trust corpus. 69. Company emerged from Chap. 11 on Jan. 30, 1

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Worldwide liquids production Mill bbl	Worldwide natural gas production Rank	Worldwide natural gas production Bcf	Worldwide liquids reserves Rank	Worldwide liquids reserves Mill bbl	Worldwide natural gas reserves Rank	Worldwide natural gas reserves Bcf	U.S. liquids production Rank	U.S. liquids production Mill bbl	U.S. natural gas production Rank	U.S. natural gas production Bcf	U.S. liquids reserves Rank	U.S. liquids reserves Mill bbl	U.S. natural gas reserves Rank	U.S. natural gas reserves Bcf	U.S. net wells drilled Rank	U.S. net wells drilled Wells
0.017	348	0.035	346	0.050	336	0.473	310	0.017	346	0.035	345	0.050	334	0.473	281	0.35
0.012	340	0.045	304	0.134	324	0.654	331	0.012	338	0.045	302	0.134	322	0.654	251	0.76
0.031	241	0.371	273	0.222	297	1.583	281	0.031	238	0.371	271	0.222	294	1.583	—	—
0.006	338	0.056	310	0.123	328	0.595	355	0.006	336	0.056	308	0.123	326	0.595	—	NA
0.001	372	0.015	384	0.001	380	0.016	384	0.001	370	0.015	384	0.001	380	0.016	—	—
0.078	—	—	206	0.778	—	—	225	0.078	—	—	203	0.778	—	—	—	—
0.009	358	0.027	318	0.112	341	0.409	341	0.009	356	0.027	316	0.112	340	0.409	—	—
0.001	276	0.170	383	0.004	303	1.287	382	0.001	273	0.170	382	0.004	301	1.287	307	0.06
0.001	379	0.007	378	0.009	374	0.080	380	0.001	377	0.007	378	0.009	373	0.080	—	NA
0.001	—	—	269	0.245	—	—	374	0.001	—	—	267	0.245	—	—	—	—
0.002	332	0.069	376	0.011	269	2.600	371	0.002	330	0.069	376	0.011	267	2.600	274	0.45
0.024	312	0.099	307	0.127	332	0.518	295	0.024	310	0.099	305	0.127	330	0.518	—	—
(s)	288	0.130	388	(s)	337	0.464	389	(s)	285	0.130	388	(s)	335	0.464	289	0.28
0.012	369	0.017	316	0.113	319	0.822	332	0.012	367	0.017	314	0.113	317	0.822	—	—
0.004	345	0.041	368	0.017	373	0.081	365	0.004	343	0.041	367	0.017	372	0.081	308	0.05
0.006	307	0.105	359	0.027	335	0.486	356	0.006	305	0.105	358	0.027	333	0.486	241	0.88
0.016	371	0.017	328	0.080	367	0.098	315	0.016	369	0.017	327	0.080	366	0.098	169	3.00
0.014	313	0.097	342	0.054	343	0.399	327	0.014	311	0.097	341	0.054	342	0.399	295	0.17
—	321	0.086	—	—	—	[127]NA	—	—	319	0.086	—	—	—	[127]NA	284	0.32
0.002	365	0.020	369	0.017	348	0.304	369	0.002	363	0.020	368	0.017	347	0.304	192	2.00
0.037	337	0.057	300	0.143	353	0.235	272	0.037	335	0.057	298	0.143	352	0.235	—	—
0.016	356	0.032	341	0.057	371	0.090	317	0.016	354	0.032	340	0.057	370	0.090	—	NA
0.008	328	0.075	364	0.021	314	0.927	349	0.008	326	0.075	363	0.021	312	0.927	170	3.00
0.008	374	0.012	345	0.052	365	0.107	347	0.008	372	0.012	344	0.052	364	0.107	315	0.01
0.013	343	0.041	343	[30]0.053	347	[30]0.330	330	0.013	341	0.041	342	[30]0.053	346	[30]0.330	302	0.11
(s)	385	(s)	205	0.781	268	2.649	390	(s)	384	(s)	202	0.781	266	2.649	301	0.11
0.014	386	(s)	306	0.131	383	0.001	324	0.014	385	(s)	304	0.131	383	0.001	215	1.33
0.022	308	0.105	361	0.024	356	0.203	298	0.022	306	0.105	360	0.024	355	0.203	316	0.01
0.051	376	0.010	280	[30]0.194	379	[30]0.040	250	0.051	374	0.010	278	[30]0.194	379	[30]0.040	—	NA
0.007	360	0.026	305	0.133	334	0.505	350	0.007	358	0.026	303	0.133	332	0.505	97	10.66
0.011	350	0.034	329	0.080	355	0.222	334	0.011	348	0.034	328	0.080	354	0.222	260	0.62
0.002	364	0.020	374	0.012	340	0.417	370	0.002	362	0.020	374	0.012	339	0.417	219	1.25
0.001	375	0.011	375	0.012	346	0.350	379	0.001	373	0.011	375	0.012	345	0.350	—	NA
0.001	368	0.018	382	[30]0.004	376	[30]0.060	383	0.001	366	0.018	383	[30]0.004	376	[30]0.060	—	—
0.004	367	0.019	377	0.009	377	0.050	367	0.004	365	0.019	377	0.009	377	0.050	—	—
0.016	351	0.034	322	0.105	366	0.105	313	0.016	349	0.034	320	0.105	365	0.105	279	0.38
0.004	381	0.003	355	0.031	372	0.090	363	0.004	380	0.003	354	0.031	371	0.090	262	0.61
—	380	0.004	—	—	375	0.072	—	—	379	0.004	—	—	374	0.072	—	NA
0.007	361	0.026	337	0.066	351	0.294	352	0.007	359	0.026	336	0.066	350	0.294	—	—
(s)	352	0.034	386	0.001	369	0.091	387	(s)	350	0.034	386	0.001	368	0.091	211	1.50
0.002	319	0.089	380	0.008	370	0.090	372	0.002	317	0.089	380	0.008	369	0.090	—	—
0.001	—	—	379	0.009	378	0.049	385	0.001	—	—	379	0.009	378	0.049	—	—
0.006	383	0.002	—	—	—	—	359	0.006	382	0.002	—	—	—	—	121	5.85
3,835.4		13,018.5		35,445.2		182,083.1		2,386.5		10,082.3		22,444.9		130,865.9		10,993.35

fiscal yearend. 70. Fiscal yearend Nov. 30. 71. Subsidiary of CBI Industries Inc. 72. Formerly Drilling & Exploration Co. 73. Income from continuing operations before income taxes. Subsidiary of National Distillers & Chemical Corp. 75. Reserves and production are for Oct. -Oct. 1986. 76. Energy segment includes oil, gas and coal operations. 77. Financial data is pro to reflect merger with Clinton America Corp. 78. Doesn't include dry hole costs. 79. Formerly rs Inc. 80. Subsidiary of Gulf Resources & Chemical Corp. 81. Subsidiary of Public Service Co. lorado. 82. Subsidiary of Washington Energy Corp. 83. Subsidiary of Brooklyn Union Gas Co. Subsidiary of Penn Virginia Corp. 85. Pyro Energy owns 67% of company's stock. 86. Subsidiary cificorp. 87. Kelley Oil owns 2% of partnership units. 88. Figures are for period from inception n. 23, 1986 through Dec. 31, 1986. 89. U.S. subsidiary of Canada Northwest Energy Ltd. axon Oil owns 30% of partnership units. 91. M.A. Hanna Co. owns 99% of stock but company tes independently. 92. Formerly listed under parent company MDU Resources Group Inc. .S. subsidiary of Coho Resources Ltd. 94. Thirteen months ended Jan. 31, 1987. 95. Subsidf Northwest Natural Gas Co. 96. Fiscal yearend Apr. 30. 97. Subsidiary of Energen Corp. ompany emerged from Chap. 11 on Feb. 28, 1987 after fiscal yearend. 99. Fiscal yearend Feb. 986. 100. Subsidiary of Sparton Corp. 101. Since fiscal yearend company has agreed to merge McFarland Energy. 102. Since fiscal yearend company has sold all oil and gas properties. Six months. 104. Fiscal yearend July 31. 105. Fiscal yearend Feb. 28, 1987. 106. Company's principal business is management of ConVest Energy Partners of which it owns 10% of partnership units. 107. Fiscal yearend Oct. 31. 108. Fiscal year covers 15 months ended Mar. 31, 1987. Company has agreed to merge with Oxford Consolidated. 109. Operating income before interest, income tax and write down of assets. 110. U.S. subsidiary of Silverton Resources Ltd. 111. Since fiscal yearend has agreed to merge with Patrick Petroleum. 112. Nine months. 113. Since fiscal yearend has agreed to merge with Lomak Petroleum. 114. Since fiscal yearend company has made agreements to acquire Kee Exploration, Diablo Oil, Sierra Exploration, Noarko Resources, and Wichita Industries. 115. Formerly listed under parent company, Wicor Inc. 116. Operating income before taxes. 117. Gross before deduction of royalties and taxes. 118. Since fiscal yearend has agreed to merger with Western Energy Development Co. 119. Subsidiary of Twin Richfield Oil Ltd. 120. Fourteen months. 121. Fiscal yearend Jan. 31, 1986. 122. Since fiscal yearend company has agreed to merger with Tipperary. 123. Four months. 124. Since fiscal yearend has agreed to merger with Fountain Oil & Gas. 125. Hadson owns 85% of company's stock. 126. Formed through merger of Nova Petroleum and Power Resources. 127. Company has gas reserves but they have not been estimated. 128. U.S. subsidiary of Tiber Energy Corp. 129. Formerly Universal Energy. 130. A development stage company.

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The OGJ400 Company Index

Rank by total assets	Company name	Headquarters city
223	**Adams Resources & Energy Inc.**	Houston
81	**Adobe Resources Corp.**	New York
158	**Alamco Inc.**	Clarksburg, WV
337	**Albion International Resources Inc.**	Laguna Beach, CA
176	**Alexander Energy Corp.**	Oklahoma City
104	**Allegheny & Western Energy Corp.**	Charleston, WV
276	**Alta Energy Corp.**	Midland, TX
277	**Altex Industries Inc.**	Denver
382	**Amacan Resources Corp.**	Salt Lake City
163	**AMAX Inc. (Oil & Gas Operators)**	Greenwich, CT
398	**Amber Resources Co.**	Denver
262	**Amcole Energy Corp.**	Fort Worth
20	**Amerada Hess**	New York
141	**American Exploration Co.**	Houston
181	**American Oil & Gas Corp.**	Houston
39	**American Petrofina Inc.**	Dallas
178	**American Quasar Petroleum Co.**	Fort Worth
87	**American Royalty Trust**	Houston
6	**Amoco Corp.**	Chicago
48	**Anadarko Petroleum Corp.**	Houston
65	**Apache Corp.**	Denver
68	**Apache Petroleum Co. L.P.**	Denver
327	**Appalachian Oil & Gas Co. Inc.**	Chatanooga, TN
247	**Arapaho Petroleum Inc.**	Englewood, CO
308	**Arch Petroleum Inc.**	Fort Worth
7	**ARCO (Atlantic Richfield Corp.)**	Los Angeles
173	**Argo Petroleum Corp.**	Santa Monica, CA
32	**Arkla Inc.**	Shreveport, LA
134	**Asamera Inc.**	Calgary, Alberta
23	**Ashland Oil Inc.**	Ashland, KY
316	**Aspen Exploration Corp.**	Denver
119	**Avalon Corp.**	New York
225	**Barrett Resources Corp.**	Denver
209	**Baruch-Foster Corp.**	Dallas
257	**Basic Earth Science Systems Inc.**	Englewood, CO
279	**Bayou Resources Inc.**	Houston
159	**Beard Oil Co.**	Oklahoma City
253	**Belcor Inc.**	Irvine, CA
211	**Belden & Blake Energy Co.**	North Canton, OH
233	**Bellwether Exploration Co.**	Denver
365	**Bengal Oil & Gas Corp.**	London, U.K.
44	**BHP Petroleum (Americas), Inc.**	Houston
347	**Big Piney Oil & Gas Co.**	Salt Lake City
287	**Black Gold Energy Resources Inc.**	Parker, CO
179	**Bogert Oil Co.**	Oklahoma City
368	**Bolyard Oil & Gas Ltd.**	Denver
383	**Bowtex Energy (Canada) Corp.**	Calgary, Alberta
384	**Bristol Oil & Gas Inc.**	Midland, TX
213	**Brock Exploration Corp.**	New Orleans
392	**Bronco Oil & Gas Co.**	Denver
265	**Burkhart Petroleum Corp.**	Tulsa
296	**Burton/Hawks Inc.**	Casper, WY
45	**Cabot Corp.**	Waltham, MA
154	**Callon Petroleum Co.**	Natchez, MS
187	**Calumet Industries Inc.**	Chicago
363	**Carmel Energy Inc.**	Houston
281	**Castle Energy Corp.**	Blue Bell, PA
339	**Castle Royalty L.P.**	Kansas City, MO
40	**Celeron Corp.**	Santa Barbara, CA
124	**Canergy Corp.**	Dallas
69	**CENEX (Farmer's Union Central Exchange)**	St. Paul
322	**Chaparral Resources Inc.**	Denver
182	**Chapman Energy Inc.**	Dallas
4	**Chevron Corp.**	San Francisco
364	**Cheyenne Resources Inc.**	Cheyenne, WY
144	**Chieftain Development Co. Ltd.**	Edmonton, AB
373	**Circle Seven Oil & Gas Inc.**	Jacksboro, TX
17	**Coastal Corp.**	Houston
250	**Cobb Resources Corp.**	Albuquerque
207	**Coho Resources Inc.**	Calgary, Alberta
18	**Columbia Gas System Inc.**	Wilmington, DE
314	**Columbine Exploration Corp.**	Denver
367	**Comanche Oil Exploration Inc.**	Denver
260	**Com-Tek Resources Inc.**	Denver
15	**Conoco Corp.**	Houston
137	**Conquest Exploration Co.**	Houston
22	**Consolidated Natural Gas Co.**	Pittsburgh
138	**Consolidated Oil & Gas Inc.**	Denver
246	**ConVest Energy Corp.**	Houston
186	**ConVest Energy Partners Ltd.**	Houston
269	**Coseka Resources Ltd.**	Calgary, Alberta
284	**Credo Petroleum Corp.**	Denver
315	**Crescent Oil & Gas Corp.**	Denver
396	**Croff Oil Co.**	Denver
86	**Crown Central Petroleum Corp.**	Baltimore
390	**Crown Energy Corp**	Salt Lake City
338	**Crown Resource Corp.**	Denver
136	**Crystal Oil Co.**	Shreveport, LA
79	**CSX Oil & Gas Corp.**	Houston
298	**Dallas Oil & Minerals Inc.**	Fort Worth
109	**Damson Oil Corp.**	New York
97	**DeKalb Energy Cos.**	Denver
189	**Deminex U.S. Oil Co.**	Dallas
177	**Devon Resource Investors**	Oklahoma City
166	**DI Industries Inc.**	Houston
388	**Diablo Oil Co.**	Denver
24	**Diamond Shamrock Corp.**	Dallas
84	**Diamond Shamrock Offshore Partners L.P.**	Dallas
255	**Dietrich Resources Corp.**	Denver
64	**Diversified Energies Inc.**	Minneapolis
245	**Dorchester Hugoton Ltd.**	Dallas
329	**Double Eagle Petroleum & Mining Co.**	Casper, WY
354	**Eagle Exploration Co.**	Denver
359	**EMC Energies Inc.**	Casper, WY
243	**Energy Assets International Corp.**	New York
304	**Energy Capital Development Corp.**	Rosslyn, VA
239	**Energy Management Corp.**	Denver
325	**Energy Resources of North Dakota Inc.**	Williston, ND
193	**Energy Ventures Inc.**	New York
188	**Enex Resources Corp.**	Kingwood, TX
16	**Enron Corp.**	Houston
27	**Enserch Corp.**	Dallas
53	**Enserch Exploration Partners Ltd.**	Dallas
130	**Ensource Inc.**	Houston
157	**Entex Energy Development Ltd.**	Houston
197	**Equitable Petroleum Corp.**	New York
54	**Equitable Resources Inc.**	Pittsburgh
153	**Equity Oil Co.**	Salt Lake City
156	**Ethyl Corp. (Energy Segment)**	Richmond, VA
236	**Evergreen Resources Inc.**	Denver
320	**Exploration Co.**	San Antonio
148	**Exploration Co. of Louisiana Inc.**	Lafayette, LA
1	**Exxon Corp.**	New York
283	**Falcon Oil & Gas Co. Inc.**	Odessa, TX
194	**Federated Natural Resources Corp.**	Traverse City, MI
114	**Felmont Oil Corp.**	Stamford, CT
206	**Fidelity Oil Co.**	Bismark, ND
91	**First Mississippi Corp.**	Jackson, MS
395	**Five Star Energy Corp.**	Calabasas, CA
142	**Flag-Redfern Oil Co.**	Midland, TX
78	**Forest Oil Corp.**	Bradford, PA
288	**Fountain Oil & Gas Inc.**	Denver
89	**FPCO Oil & Gas Co.**	Denver
62	**Freeport-McMoRan Energy Partners Ltd.**	New Orleans
31	**Freeport-McMoRan Inc.**	New Orleans
147	**Freeport-McMoRan Oil & Gas Royalty Trust**	Houston
168	**Fuel Resources Development Co.**	Denver
171	**Fuel Resources Inc.**	Brooklyn, NY
162	**Galaxy Oil Co.**	Wichita Falls, TX
244	**Geodyne Resources Inc.**	Tulsa
271	**GeoResources Inc.**	Williston, ND
291	**Gerber Energy International Inc.**	Denver
47	**Global Marine Inc.**	Houston
129	**Global Natural Resources Inc.**	Houston
264	**Golden Oil Co.**	Denver
366	**Golden Triangle Royalty & Oil Inc.**	Cisco, TX
55	**Grace Natural Resources Group**	Dallas
143	**Graham-McCormick Oil & Gas Partnership**	Covington, LA
219	**Great American Partners**	San Diego
290	**Great Eastern Energy & Development Corp.**	Englewood, CO
301	**Greenwood Resources Inc.**	Englewood, CO
111	**Hadson Corp.**	Oklahoma City
61	**Hamilton Oil Corp.**	Denver
121	**Harken Oil & Gas Inc.**	Bedford, TX
74	**Helmerich & Payne Inc.**	Tulsa
302	**Henry Energy Corp.**	Arlington, TX
216	**Hershey Oil Corp.**	Pasadena, CA
375	**Hipoint Investments Ltd.**	Oklahoma City
102	**Home Petroleum Corp.**	Denver
258	**Home-Stake Oil & Gas Co.**	Tulsa
235	**Home-Stake Royalty Corp.**	Tulsa
270	**Houston Oil Royalty Trust**	Houston
151	**Houston Oil Trust**	Houston
397	**Houston Oil & Energy Inc.**	Cisco, TX
113	**Howell Corp.**	Houston
355	**Hubco Exploration Inc.**	New Orleans
376	**Hughes Texas Petroleum Corp.**	Hattiesburg, MS
345	**Impact Energy Inc.**	Denver
400	**Imperial Energy Corp.**	Denver
139	**Integrated Drilling & Exploration Inc.**	Tulsa
275	**Intercontinental Energy Corp.**	Englewood, CO
350	**International Royalty & Oil Co.**	Fort Worth
328	**Intramerican Oil & Minerals Inc.**	Dallas
266	**Jackson Exploration Inc.**	Dallas
378	**J.M. Resources Inc.**	Dallas
110	**Kaiser Energy Inc.**	Oakland, CA
118	**Kaneb Energy Partners Ltd.**	Sugar Land, TX
83	**Kaneb Services Inc.**	Sugar Land, TX
389	**Katy Energy Corp.**	Riveria, FL
393	**Kee Exploration Inc.**	Denver
333	**Kelden Oil Co.**	Bismark, ND
295	**Kelley Oil Corp.**	Houston
198	**Kelley Oil & Gas Partners Ltd.**	Houston
203	**KenCope Energy Companies**	San Antonio
28	**Kerr-McGee Corp.**	Oklahoma City
226	**Kimbark Oil & Gas Co.**	Denver
120	**Kirby Exploration Co. Inc.**	Houston
299	**KRM Petroleum Corp.**	Denver
161	**Leader Development Corp.**	Columbus, OH
192	**LL&E Royalty Trust**	Houston
220	**Lomak Petroleum Inc.**	Hartville, OH
42	**Louisiana Land & Exploration Co.**	New Orleans
349	**Love Oil Co. Inc.**	Denver
317	**Lyric Energy Inc.**	Amarillo, TX
196	**MacMillan Ring Free Oil Co. Inc.**	New York
224	**Magic Circle Energy Corp.**	Oklahoma City
174	**May Energy Partners Ltd.**	Dallas
149	**May Petroleum Inc.**	Dallas
172	**Maynard Oil Co.**	Dallas
202	**McFarland Energy Inc.**	Sante Fe Springs, CA

The OGJ400 Company Index (continued)

Rank by total assets	Company name	Headquarters city
135	**MCO Resources Inc.**	Houston
372	**Melton Drilling & Exploration Co.**	Midland, TX
30	**Meridian Oil Inc.**	Fort Worth
29	**Mesa Limited Partnership**	Amarillo, TX
230	**Michigan Oil Co.**	Jackson, MI
204	**Midland SouthWest Corp.**	Midland, TX
353	**Midwest Exploration Inc.**	Oklahoma City
326	**Mineral Development Inc.**	Dallas
33	**Mitchell Energy & Development Co.**	The Woodlands, TX
2	**Mobil Corp.**	New York
294	**Monogram Oil & Gas Inc.**	North Canton, OH
38	**Montana Power Co.**	Butte, MT
75	**Moore McCormack Energy Inc.**	Dallas
205	**MSR Exploration Ltd.**	Cut Bank, MT
35	**Murphy Oil Corp.**	El Dorado, AR
280	**Mustang Cos. Inc.**	Great Bend, KS
278	**Nahama & Weagant Energy Co.**	Bakersfield, CA
92	**National Cooperative Refinery Association**	McPherson, KS
50	**National Fuel Gas Co.**	New York
191	**Nerco Oil & Gas Inc.**	Vancouver, WA
248	**Newhall Resources**	Valencia, CA
34	**Nicor Inc.**	Naperville, IL
385	**Noarko Resources Inc.**	Denver
71	**Noble Affiliates Inc.**	Ardmore, OK
128	**Noble Drilling Corp.**	Tulsa
103	**NOMECO (Northern Michigan Exploration Co.)**	Jackson, MI
107	**Norcen Energy Resources Ltd.**	Calgary, Alberta
311	**Normandy Oil & Gas Co. Inc.**	Fort Worth
240	**Norris Oil Co.**	Beverly Hills, CA
332	**Nova Natural Resources Corp.**	Salt Lake City
305	**NP Energy Corp.**	Los Angeles
94	**NRM Energy Co. L.P.**	Dallas
217	**Nugget Oil Corp.**	Bloomington, MN
99	**NUI Corp.**	Bridgewater, NJ
229	**Oakridge Energy Inc.**	Wichita Falls, TX
9	**Occidental Petroleum Corp.**	Los Angeles
51	**Ocean Drilling & Exploration Co.**	New Orleans
374	**Oil City Petroleum Inc.**	Tulsa
155	**OKC Limited Partnership**	Dallas
56	**Oneok Inc.**	Tulsa
212	**Oregon Natural Gas Development Corp.**	Portland, OR
386	**ORS Corp.**	Tulsa
306	**Oxford Consolidated Inc.**	Denver
184	**Oxoco Inc.**	Houston
90	**Pacific Lighting Oil & Gas Co.**	Los Angeles
303	**Paloma Petroleum Ltd.**	Calgary, Alberta
391	**Pan Energy Resources Inc.**	West Chester, PA
360	**Pangea Petroleum Co.**	Torrance, CA
268	**Panhandle Royalty Co.**	Oklahoma City
324	**Pantepec International Inc.**	Woodbridge, CT
300	**Parallel Petroleum Corp.**	Midland, TX
116	**Park-Ohio Industries Inc.**	Cleveland
267	**Partners Oil Co.**	Houston
335	**Pathfinder Petroleum Corp.**	Oklahoma City
169	**Patrick Petroleum Co.**	Jackson, MI
150	**Pauley Petroleum Inc.**	Los Angeles
108	**Pelto Oil Co.**	Houston
167	**Pend Oreille Oil & Gas Co.**	Houston
292	**Peninsula Resources Corp.**	Corpus Christi, TX
323	**Penn Pacific Corp.**	Santa Ana, CA
183	**Penn Virginia Resources Corp.**	Duffield, VA
25	**Pennzoil Co.**	Houston
254	**Permian Basin Royalty Trust**	Fort Worth
341	**Petrol Industries Inc.**	Shreveport, LA
199	**Petroleum Development Corp.**	Bridgeport, WV
195	**Petroleum Investments Ltd.**	Oklahoma City
273	**Petroleum Reserve Corp.**	Tulsa
272	**Petromark Resources Co.**	Tulsa
232	**Petrominerals Corp.**	Stanton, CA
274	**Petrotech Inc.**	Englewood, CO
11	**Phillips Petroleum Co.**	Bartlesville, OK
351	**Pioneer Oil & Gas Corp.**	Midvale, UT
190	**Plains Petroleum Co.**	Lakewood, CO
165	**Plains Resources Inc.**	Oklahoma City
318	**Plano Petroleum Corp.**	Plano, TX
72	**Pogo Producing Co.**	Houston
106	**Prairie Producing Co.**	Houston
231	**Premier Resources Ltd.**	Denver
164	**Presidio Oil Co.**	Englewood, CO
285	**Prima Energy Corp.**	Denver
46	**Primark Corp.**	McLean, VA
85	**Primary Fuels Inc.**	Houston
261	**Pyramid Oil Co.**	Bakersfield, CA
112	**Pyro Energy Corp.**	Evansville, IN
259	**QED Exploration Inc.**	Denver
200	**Quadra Oil & Gas Inc.**	Denver
70	**Quaker State Corp.**	Oil City, PA
336	**Questa Oil & Gas Co.**	Littleton, CO
52	**Questar Corp.**	Salt Lake City
101	**Quinoco Cos.**	Denver
115	**Ram Industries Inc.**	Dallas
321	**Ranger Oil Ltd.**	Calgary, Alberta
214	**Ratex Resources Inc.**	Oklahoma City
63	**Reading & Bates Corp.**	Tulsa
342	**Reef Energy Corp.**	Traverse City, MI
309	**Republic Resources Corp.**	Oklahoma City
348	**Reserve Exploration Co.**	Tulsa
215	**Resource Exploration Inc.**	Akron, OH
319	**Roberts Oil & Gas Inc.**	Houston
310	**Roseland Oil & Gas Co. Inc.**	Tyler, TX
58	**Rowan Cos. Inc.**	Houston
234	**Royal Resources Corp.**	Denver
93	**Sabine Corp.**	Dallas
221	**Sabine Royalty Trust**	Dallas
241	**Sage Drilling Co. Inc.**	Wichita, KS
126	**Sage Energy Co.**	San Antonio
180	**Samson Energy Co.**	Tulsa
133	**San Juan Basin Royalty Trust**	Fort Worth
60	**Santa Fe Energy Co.**	Houston
88	**Santa Fe Energy Partners L.P.**	Houston
228	**Saxon Oil Co.**	Dallas
201	**Saxon Oil Development Partners L.P.**	Dallas
394	**Score Exploration Corp.**	Casper, WY
95	**Seagull Energy Corp.**	Houston
237	**Seahawk Oil International Inc.**	Newport Beach, CA
331	**Seaxe Energy Corp.**	Jackson, MS
361	**Sharon Energy Ltd.**	Englewood, CO
399	**Shaw Resources Inc.**	Riverside, CA
358	**Sheffield Exploration Co. Inc.**	Denver
5	**Shell Oil Co.**	Houston
330	**Sierra Exploration Co.**	Denver
125	**Snyder Oil Partners L.P.**	Fort Worth
26	**Sonat Inc.**	Birmingham, AL
362	**South Texas Drilling & Exploration Inc.**	San Antonio
312	**Southern Mineral Corp.**	Houston
82	**Southern Union Co.**	Dallas
98	**Southwestern Energy Co.**	Fayetteville, AR
146	**SPG Exploration Corp.**	San Antonio
10	**Standard Oil Co.**	Cleveland
117	**Statex Petroleum Inc.**	San Diego
377	**Sterling Oil of Oklahoma Inc.**	Tulsa
282	**Strata Corp.**	Columbus, OH
252	**Striker Petroleum Corp.**	Englewood, CO
242	**Summit Energy Inc.**	Dallas
13	**Sun Co.**	Radnor, PA
344	**Sunbelt Exploration Inc.**	Fort Worth
80	**Sunshine Mining Co.**	Dallas
222	**Swift Energy Co.**	Houston
218	**Taurus Exploration Inc.**	Birmingham, AL
346	**Taurus Petroleum Inc.**	Denver
8	**Tenneco Inc.**	Houston
73	**Tesoro Petroleum Corp.**	San Antonio
3	**Texaco Inc.**	White Plains, NY
123	**Texas American Energy Corp.**	Midland, TX
19	**Texas Eastern Corp.**	Houston
105	**Texas International Co.**	Oklahoma City
387	**Texas Vanguard Oil Co.**	Austin, TX
251	**Texon Energy Corp.**	Houston
100	**TGX Corp.**	Houston
170	**Thermal Exploration Co.**	Seattle
249	**Thor Energy Resources Inc.**	Tyler, TX
379	**Tiber Resources Inc.**	Calgary, Alberta
76	**Tidewater Inc.**	New Orleans
185	**Tipperary Corp.**	Midland, TX
352	**Toklan Oil Corp.**	Tulsa
145	**Tom Brown Inc.**	Midland, TX
77	**Tosco Corp.**	Santa Monica, CA
57	**Total Petroleum (North America) Ltd.**	Denver
369	**TPEX Exploration Inc.**	Golden, CO
21	**Transco Energy Co.**	Houston
49	**Transco Exploration Partners Ltd.**	Houston
152	**Tribune/Swab-Fox Cos. Inc.**	Tulsa
227	**Trinity Resources Ltd.**	Houston
96	**Triton Energy Corp.**	Dallas
370	**Tri-Valley Corp.**	Bakersfield, CA
210	**Tucker Drilling Co. Inc.**	San Angelo, TX
307	**Twin Richfield Oils Inc.**	Calgary, Alberta
313	**Tyrex Oil Co.**	Casper, WY
66	**Unimar Corp.**	Tarrytown, NY
43	**Union Exploration Partners Ltd.**	Los Angeles
37	**Union Pacific Resources Co.**	Fort Worth
36	**Union Texas Petroleum Holdings Inc.**	Houston
140	**Unit Corp.**	Tulsa
380	**United Western Energy Corp.**	Oklahoma City
132	**Universal Resources Corp.**	Dallas
14	**Unocal Corp.**	Los Angeles
263	**Usenco Inc.**	Fort Worth
12	**USX Corp. (Oil & Gas Segment)**	Pittsburgh
41	**Valero Energy Corp.**	San Antonio
293	**Valex Petroleum Inc.**	Denver
238	**Vermilion Bay Land Co.**	Lafayette, LA
122	**Wainoco Oil Corp.**	Houston
175	**Walker Energy Partners**	Houston
289	**Wepco Energy Co.**	Cleveland
256	**Western Energy Development Co. Inc.**	Denver
340	**Western Energy Resources Inc.**	Mission Viejo, CA
357	**Western Natural Gas Co.**	Dallas
297	**Wexco of Delaware Inc.**	Milwaukee
286	**Whiting Petroleum Corp.**	Denver
334	**Wichita Industries Inc.**	Denver
356	**Wicklund Petroleum Corp.**	Bloomfield Hills, MI
343	**Willard Pease Oil & Gas Co.**	Grand Junction, CO
160	**Wilshire Oil Co. of Texas**	Jersey City, NJ
127	**Wintershall Corp.**	Englewood, CO
131	**Wiser Oil Co.**	Sistersville, WV
371	**Wyoming Oil & Minerals Inc.**	Casper, WY
67	**Yankee Cos. Inc.**	Cohasset, MA
381	**Yellowstone Resources Inc.**	Denver
59	**Zapata Corp.**	Houston
208	**ZIM Energy Corp.**	Houston

CRUDE OIL ASSAYS

Key to the assays . . .

Each assay is headed, in the following order, by the official name of the crude, the former or secondary name in parenthesis, the country of origin, and location and type loading facilities. Loading systems that frequently crop up are abbreviated. Those used are CBM (conventional buoy mooring), SPM (single point mooring), SBM (single buoy mooring), CALM (catenary anchor leg mooring), and SALM (single anchor leg mooring).

Mideast

Aboozar (Ardeshir), Iran

Terminal Kharg Island

Crude
Gravity, °API: 26.9
Sulfur, wt %: 2.48
Rvp, psi: 5.5
H_2S (dissolved) wt %: 0.031
H_2S (evolved) wt %: 0.089
Pour pt, °F.: −30
Salt, lb/1,000 bbl: 55.0
Neutralization value, mg KOH/g: 1.96
Rams. carbon, wt %: 5.9
Kin. vis., cSt @ 68° F.: 36.58
  @ 122° F.: 12.76
V/Ni, ppm: 71/21
Light hydrocarbons, vol %: 3.86

Naphtha
Range (TBP), °F.: C_5-200
Yield, vol %: 5.5
Gravity, °API: 80.2
Sulfur (total) wt %: 0.090
Mercaptan S, wt %: 0.044
Rvp, psi: 10.3
Paraffins, vol %: 72.6
Naphthenes, vol %: 24.2
Aromatics, vol %: 3.1
RON, clear: 71.7
MON, clear: 67.9

Naphtha
Range (TBP), °F.: 200-320
Yield, vol %: 8.4
Gravity, °API: 55.7
Sulfur (total) wt %: 0.097
Mercaptan S, wt %: 0.027
Rvp, psi: 1.0
P/N/A, vol %: 60.1/27.3/12.7
RON, clear: 45.7
MON, clear: 44.3

Naphtha
Range (TBP), °F.: 320-360
Yield, vol %: 3.8
Gravity, °API: 48.6
Sulfur (total), wt %: 0.158
Mercaptan S, wt %: 0.023
P/N/A, vol %: 59.1/25.8/15.1
RON, clear: 30.2
MON, clear: 31.4

Kerosine
Range (TBP), °F.: 360-520
Yield, vol %: 14.4
Gravity, °API: 41.9
Sulfur (total), wt %: 0.452
Mercaptan S, wt %: 0.015
Aniline pt, °F.: 143.9
Diesel index: 60.2
Cetane index: 49.3
Freeze pt, °F.: −32
Cloud pt, °F.: −49
Pour pt, °F.: −52
Smoke pt, mm: 20

Gas oil
Range (TBP), °F.: 520-650
Yield, vol %: 12.7
Gravity, °API: 33.4
Sulfur (total), wt %: 1.274
Charac. factor: 11.74
Aniline pt, °F.: 158.8
Diesel index: 53.0
Cetane index: 52.7
Cloud pt, °F.: 21
Pour pt, °F.: 18
Vis., SUS @ 100° F.: 40.4
  @ 122° F.: 37.1

Residuum
Range (TBP), °F.: 650+
Yield, vol %: 53.5
Gravity, °API: 12.5
Sulfur (total), wt %: 3.804
Pour pt, °F.: 56
Rams. carbon, wt %: 10.0
Vis., SUS @ 122° F.: 12,303.9
  @ 210° F.: 465.9
V/Ni, ppm: 120/36

Residuum
Range (TBP), °F.: 1,050+
Yield, vol %: 24.2
Gravity, °API: 3.5
Sulfur (total), wt %: 5.069
Pour pt, °F.: 210
Rams. carbon, wt %: 19.6
Vis., SUS @ 210° F.: 125,012.7
V/Ni, ppm: 244/74

Abu Al Bu Khoosh, Abu Dhabi, U.A.E.

Storage tanker offshore producing area

Crude
Gravity, °API: 31.6
Sulfur, wt %: 2.0
Pour pt, °C.: −12 (−24.5° F.)
Kin. vis., 37.8° C. cSt: 6.7
Con. carbon, wt %: 4.3
Rvp, psi: 3.5
V/Ni, ppm: 12/7
Ibp-15° C. yield, wt %: 0.59
  vol %: 0.69

Light naphtha
Range, °C.: 15-65
Yield, wt %: 2.74
  vol %: 3.59
Gravity, °API: 88.7
Sulfur, wt %: 0.03
Mercaptans, ppm: 325
Paraffins, vol %: 95
Naphthenes, vol %: 4.4
Aromatics, vol %: 0.06
RON, clear: 74
RON + 3 ml TEL: 94.5

Heavy naphtha
Range, °C.: 65-165
Yield, wt %: 14.45
  vol %: 16.83
Gravity, °API: 59.6
Sulfur, wt %: 0.05
Mercaptans, ppm: 276
P/N/A, vol %: 68.3/18.5/13.2

Kerosine
Range, °C.: 165-230
Yield, wt %: 11.52
  vol %: 12.53
Gravity, °API: 46.25
Sulfur, wt %: 0.16
Mercaptans, ppm: 182
P/N/A, vol %: 55.5/21.8/22.7
Freezing pt, °C.: −52.5
Aniline pt, °C.: 56.4
Diesel index: 61.7
Smoke pt, mm: 23

Light gas oil
Range, °C.: 230-300
Yield, wt %: 12.5
  vol %: 12.96
Gravity, °API: 37.6
Sulfur, wt %: 0.85
Pour pt, °C.: −27
Cloud pt, °C.: −19
Aniline pt, °C.: 65
Diesel index: 55.9
Kin. vis., cSt @ 37.8° C.: 2.63

Heavy gas oil
Range, °C.: 300-375
Yield, wt %: 13.83
  vol %: 12.71
Gravity, °API: 30.3
Sulfur, wt %: 1.9
Pour pt, °C.: +2
Cloud pt, °C.: +7
Aniline pt, °C.: 72.2
Diesel index: 49.1
Kin. vis., cSt @ 37.8° C.: 6.92

Distillate
Range, °C.: 375-550
Yield, wt %: 26.63
  vol %: 24.95
Gravity, °API: 21.4

Sulfur, wt %: 2.67
Pour pt, °C.: +26
Cloud pt, °C.: +28
Con. carbon, wt %: 0.7
Kin. vis., cSt @ 50° C.: 40.96
@ 98.9° C.: 7.89

Residue
Range, °C.: 375+
Yield, wt %: 45.37
vol %: 40.69
Gravity, °API: 14.9
Sulfur, wt %: 3.4
Pour pt, °C.: +21
Asphaltenes, wt %: 3.1
V/Ni, ppm: 30/14
Kin. vis., cSt @ 50° C.: 435
@ 98.9° C.: 40.3

Residue
Range, °C.: 550+
Yield, wt %: 18.7
vol %: 15.7
Gravity, °API: 4.3
Sulfur, wt %: 4.4
Pour pt, °C.: +50
Asphaltenes, wt %: 9.2
V/Ni, ppm: 67/35
Kin. vis., cSt @ 98.9° C.: 1.860
Pen. at 25° C.: 125

Arabian Heavy (Safaniya), Saudi Arabia

Ras Tanura

Crude
Gravity, °API: 27.9
Sulfur, wt %: 2.85
Pour pt, °F.: −20
Rvp, psi: 7.5
Kin. vis., cSt @ 70° F.: 37.0
@ 100° F.: 19.0

Light naphtha
Range, °FVT: 68-212
Yield, vol %: 7.9
Gravity, °API: 79.9
Sulfur, wt %: 0.0059
Rvp, psi: 8.5
Paraffins, vol %: 88.6
Naphthenes, vol %: 10.2
Aromatics, vol %: 1.2
RON, clear: 58.0

Heavy naphtha
Range, °FVT: 212-302
Yield, vol %: 6.8
Gravity, °API: 60.5
Sulfur, wt %: 0.016
P/N/A, vol %: 70.8/19.5/9.7

Kerosine
Range, °FVT: 302-455
Yield, vol %: 12.4
Gravity, °API: 48.4
Sulfur, wt % 0.16
Aromatics, vol %: 18.9
Freeze pt °F.: −67
Smoke pt, mm: 26
Luminometer no.: 57
Aniline pt, °F.: 141
Kin. vis., cSt @ −30° F.: 5.14
@ 100° F.: 1.14

Light gas oil
Range, °FVT: 455-650
Yield, vol %: 16.5
Gravity, °API: 35.2
Sulfur, wt %: 1.30
Pour pt, °F.: 5
Aniline pt, °F.: 154
Kin. vis., cSt @ 100° F.: 3.45
@ 210° F.: 1.30

Heavy gas oil
Range, °FVT: 650-1,049
Yield, vol %: 30.6
Gravity, °API: 20.9
Sulfur, wt %: 2.92
Pour pt, °F.: 95
Aniline pt, °F.: 173
Kin. vis., cSt @ 100° F.: 77.0
@ 210° F.: 8.46

Residual oil
Range, °FVT: 650+
Yield, vol %: 53.8
Gravity, °API: 12.6
Sulfur, wt %: 4.34
Pour pt, °F.: 60
Con. carbon, wt %: 13.3
Kin. vis., cSt @ 100° F.: 4,103
@ 210° F.: 94.2

Residual oil
Range, °FVT: 1,049+
Yield, vol %: 23.2
Gravity, °API: 3.0
Sulfur, wt %: 6.0
Pour pt, °F.: 120+
Con. carbon, wt %: 27.7
Kin. vis., cSt @ 210° F.: 55,292
Furol, sec @ 275° F.: 1,309
V/Ni/Fe, ppm: 205/64/30

Arabian Light, Saudi Arabia

Ras Tanura and Yanbu also Sidon, Lebanon

Crude
Gravity, °API: 33.4
Sulfur, wt %: 1.79
Pour pt, °F.: −30
Rvp, psi: 3.6
Kin. vis., cSt @ 70° F.: 10.2
@ 100° F.: 6.25

Light naphtha
Range, °FVT: 68-212
Yield, vol %: 8.9
Gravity, °API: 78.4
Sulfur, wt %: 0.024
Rvp, psi: 8.2
Paraffins, vol %: 86.8
Naphthenes, vol %: 10.7
Aromatics, vol %: 2.5
RON, clear: 55.0

Heavy naphtha
Range, °FVT: 212-302
Yield, vol %: 8.5
Gravity, °API: 59.3
Sulfur, wt %: 0.027
P/N/A, vol %: 68.3/19.0/12.7

Kerosine
Range, °FVT: 302-455
Yield, vol %: 16.5
Gravity, °API: 48.0
Sulfur, wt %: 0.084
Aromatics, vol %: 20.6
Freeze pt, °F.: −71
Smoke pt, mm: 23
Luminometer no.: 51
Aniline pt, °F.: 138
Kin. vis., cSt @ −30° F.: 5.39
@ 100° F.: 1.13

Light gas oil
Range, °FVT: 455-650
Yield, vol %: 19.7
Gravity, °API: 36.5
Sulfur, wt %: 1.03
Pour pt, °F.: 5
Aniline pt, °F.: 158
Kin. vis., cSt @ 100° F.: 3.35
@ 210° F.: 1.30

Heavy gas oil
Range, °FVT: 650-1,049
Yield, vol %: 29.8
Gravity, °API: 22.9
Sulfur, wt %: 2.41
Pour pt, °F.: 95
Aniline pt, °F.: 180
Kin. vis., cSt @ 100° F.: 55.5
@ 210° F.: 6.89

Residual oil
Range, °FVT: 650+
Yield, vol %: 44.6
Gravity, °API: 17.2
Sulfur, wt %: 3.1
Pour pt, °F.: 35
Con. carbon, wt %: 7.6
Kin. vis., cSt @ 100° F.: 414.3
@ 210° F.: 24.2

Residual oil
Range, °FVT: 1,049+
Yield, vol %: 14.8
Gravity, °API: 6.9
Sulfur, wt %: 4.34
Pour pt, °F.: 115
Con. carbon, wt %: 20.3
Kin. vis., cSt @ 210° F.: 1,589
Furol, sec @ 275° F.: 104
V/Ni/Fe, ppm: 116/25/114

Arabian Light (Berri), Saudi Arabia

Ras Tanura

Crude
Gravity, °API: 37.8
Sulfur, wt %: 1.19
Pour pt, °F.: −25
Rvp, psi: 4.0
Kin. vis., cSt @ 70° F.: 5.80
@ 100° F.: 3.86

Light Naphtha
Range, °FVT: 68-212
Yield, vol %: 10.1
Gravity, °API: 78.4
Sulfur, wt %: 0.071
Rvp, psi: 6.9
Paraffins, vol %: 87.4
Naphthenes, vol %: 11.2
Aromatics, vol %: 1.4
RON, clear: 50.0

Heavy naphtha
Range, °FVT: 212-302
Yield, vol %: 8.7
Gravity, °API: 58.2
Sulfur, wt %: 0.053
P/N/A, vol %: 65.3/20.4/14.3

Kerosine
Range, °FVT: 302-455
Yield, vol %: 18.7
Gravity, °API: 48.4
Sulfur, wt %: 0.090
Aromatics, vol %: 19.9
Freeze pt, °F.: −71
Smoke pt, mm: 25
Luminometer no.: 54
Aniline pt, °F.: 136
Kin. vis., cSt @ −30° F.: 4.79
@ 100° F.: 1.10

Light gas oil
Range, °FVT: 455-650
Yield, vol %: 21.2
Gravity, °API: 37.3
Sulfur, wt %: 0.72
Pour pt, °F.: 10
Aniline pt, °F.: 161
Kin. vis., cSt @ 100° F.: 3.4
@ 210° F.: 1.28

Heavy gas oil
Range, °FVT: 650-1,049
Yield, vol %: 30.3
Gravity, °API: 25.1
Sulfur, wt %: 1.83
Pour pt, °F.: 95
Aniline pt, °F.: 192
Kin. vis., cSt @ 100° F.: 44.4
@ 210° F.: 6.25

Residual oil
Range, °FVT: 650+
Yield, vol %: 39.3
Gravity, °API: 21.6
Sulfur, wt %: 2.09
Pour pt, °F.: 70
Con. carbon, wt %: 4.2
Kin. vis., cSt @ 100° F.: 128.1
@ 210° F.: 12.34

Residual oil
Range, °FVT: 1,049+
Yield, vol %: 9.0
Gravity, °API: 11.0
Sulfur, wt %: 2.88
Pour pt, °F.: 80
Con. carbon, wt %: 16.2
Kin. vis., cSt @ 210° F.: 396.9
Furol, sec @ 275° F.: 38.2
V/Ni, ppm: 9/6
Aromatics, ppm: 46

Arabian Medium (Khursaniyah), Saudi Arabia

Ras Tanura

Crude
Gravity, °API: 30.8
Sulfur, wt %: 2.40
Pour pt, °F.: +5
Rvp, psi: 3.2
Kin. vis., cSt @ 70° F.: 16.2
@ 100° F.: 9.41

Light naphtha
Range, °FVT: 68-212
Yield, vol %: 8.9
Gravity, °API: 77.7
Sulfur, wt %: 0.043
Rvp, psi: 7.9
Paraffins, vol %: 85.3
Naphthenes, vol %: 12.3
Aromatics, vol %: 2.4
RON, clear: 54.5

Heavy naphtha
Range, °FVT: 212-302
Yield, vol %: 7.7
Gravity, °API: 59.1
Sulfur, wt %: 0.050
P/N/A, vol %: 68.5/18.8/12.7

Kerosine
Range, °FVT: 302-455
Yield, vol %: 14.5
Gravity, °API: 48.0
Sulfur, wt %: 0.14
Aromatics, vol %: 20.6
Freeze pt, °F.: -62
Smoke pt, mm: 23
Luminometer no.: 52
Aniline pt, °F.: 136
Kin. vis., cSt @ -30° F.: 5.10
@ 100° F.: 1.13

Light gas oil
Range, °FVT: 455-650
Yield, vol %: 18.1
Gravity, °API: 36.0
Sulfur, wt %: 1.24
Pour pt, °F.: 15
Aniline pt, °F.: 157
Kin. vis., cSt @ 100° F.: 3.53
@ 210° F.: 1.32

Heavy gas oil
Range, °FVT: 650-1,049
Yield, vol %: 30.9
Gravity, °API: 21.9
Sulfur, wt %: 2.91
Pour pt, °F.: 100
Aniline pt, °F.: 176
Kin. vis., cSt @ 100° F.: 49.2
@ 210° F.: 6.40

Residual oil
Range, °FVT: 650+
Yield, vol %: 49.6
Gravity, °API: 15.0
Sulfur, wt %: 3.90
Pour pt, °F.: 55
Con. carbon, wt %: 9.9
Kin. vis., cSt @ 100° F.: 850
@ 210° F.: 36.0

Residual oil
Range, °FVT: 1,049+
Yield, vol %: 18.7
Gravity, °API: 4.9
Sulfur, wt %: 5.35
Pour pt, ° F.: 115
Con. carbon, wt %: 23.3
Kin. vis., cSt @ 210° F.: 3,847
Furol, sec @ 275° F.: 226
V/Ni/Fe, ppm: 96/32/30

Arabian Medium (Zuluf/Marjan), Saudi Arabia

Juayma

Crude
Gravity, °API: 31.1
Sulfur, wt %: 2.48
Pour pt, °F.: -20
Rvp, psi: 8.3
Kin. vis., cSt @ 70° F.: 19.4
@ 100° F.: 11.01

Light naphtha
Range, °FVT: 68-212
Yield, vol %: 8.9
Gravity, °API: 79.7
Sulfur, wt %: 0.0069
Rvp, psi: 9.1
Paraffins, vol %: 89.3
Naphthenes, vol %: 9.6
Aromatics, vol %: 1.1
RON, clear: 58.6

Heavy naphtha
Range, °FVT: 212-302
Yield, vol % on crude: 8.2
Gravity, °API: 60.2
Sulfur, wt %: 0.024
P/N/A, vol %: 69.3/20.2/10.5

Kerosine
Range, °FVT: 302-455
Yield, vol %: 14.1
Gravity, °API: 48.3
Sulfur, wt %: 0.14
Aromatics, vol %: 17.2
Freeze pt, °F.: -72
Smoke pt, mm: 26
Luminometer no.: 59
Aniline pt, °F.: 139
Kin. vis., cSt @ -30° F.: 5.01
@ 100° F.: 1.13

Light gas oil
Range, °FVT: 455-650
Yield, vol %: 17.6
Gravity, °API: 36.1
Sulfur, wt %: 1.25
Pour pt, °F.: 10
Aniline pt, °F.: 158
Kin. vis., cSt @ 100° F.: 3.45
@ 210° F.: 1.31

Heavy gas oil
Range, °FVT: 650-1,049
Yield, vol %: 28.2
Gravity, °API: 21.8
Sulfur, wt %: 2.90
Pour pt, °F.: 95
Aniline pt, °F.: 177
Kin. vis., cSt @ 100° F.: 72.6
@ 210° F.: 8.04

Residual oil
Range, °FVT: 650+
Yield, vol %: 48.0
Gravity, °API: 13.9
Sulfur, wt %: 4.06
Pour pt, ° F.: 55
Con. carbon, wt %: 9.4
Kin. vis., cSt @ 100° F.: 2,126
@ 210° F.: 65.9

Residual oil
Range, °FVT: 1,049+
Yield, vol %: 19.8
Gravity, °API: 3.9
Sulfur, wt %: 5.51
Pour pt, ° F.: 140
Con. carbon, wt %: 20.5
Kin. vis., cSt @ 210° F.: 20,085
Furol, sec @ 275° F.: 684
V/Ni/Fe, ppm: 179/54/40

Bahrgansar/Nowruz (SIRIP Blend), Iran

Ras Bahrgan SBM

Crude
Gravity, °API: 27.1
Sulfur, wt %: 2.45
Pour pt, °C.: -33
Vis., cSt @ 100° F.: 20.4
Con. carbon, wt %: 7.9
Rvp, kg/sq cm: 0.56
Salt, lb/1,000 bbl: 30.6
V/Ni, ppm: 72/25

Light naphtha
Range, °C.: C_5-66
Yield, wt %: 3.76
Gravity, °API: 84.3
Sulfur, wt %: 0.065
Rvp, kg/sq cm: 0.87
Paraffins, vol %: 92.3
Naphthenes, vol %: 6.3
Aromatics, vol %: 1.4
RON, clear: 67.4

Heavy naphtha
Range, °C.: 66-150
Yield, wt %: 8.59
Gravity, °API: 59.6
Sulfur, wt %: 0.06
P/N/A, vol %: 60.0/31.0/9.0
RON, clear: 48.0

Kerosine
Range, °C.: 150-250
Yield, wt %: 13.23
Gravity, °API: 46.0
Sulfur, wt %: 0.228
Aromatics, vol %: 18.5
Freezing pt, °C.: < -55
Smoke pt, mm: 22
Aniline pt, °C.: 59.8

Gas oil
Range, °C.: 250-350
Yield, wt %: 14.04
Gravity, °API: 33.6
Sulfur, wt %: 1.19
Pour pt, °C.: -12
Aniline pt, °C.: 69.2
Diesel index: 53.0

Residual oil
Range, °C.: 350+
Yield, wt %: 59.00
Gravity, °API: 11.3
Sulfur, wt %: 3.8
Pour pt, °C.: +12
Con. carbon, wt %: 13.35

Residual oil
Range, °C.: 550+
Yield, wt %: 35.90
Gravity, °API: 4.4
Sulfur, wt %: 4.84
Pour pt, °C.: > +48
Con. carbon, wt %: 21.85
V/Ni/Fe, ppm: 202/69/52

Note: Same assay first published in 1976.

Basrah Heavy, Iraq

Mina al Bakr sea terminal in Persian Gulf (Khor al Khafja)

Crude
Gravity, °API: 24.7
Sulfur, wt %: 3.5
Pour pt, °C.: −30
Kin. vis. @ 10° C., cSt: 86.3
C_4 & lighter, wt %: 0.8

Light SR naphtha
Range, °C.: C_5-65
Yield, wt %: 2.6
Density @ 15° C., g/cu m: 0.648
RON + 0.4 g Pb/l: 83

Heavy SR naphtha
Range, °C.: 65-175
Yield, wt %: 12.2
Density @ 15° C., g/cu m: 0.74
RON + 0.4 g Pb/l: 55
Aromatics, vol %: 9.5
Naphthenes, vol %: 21

Kerosine
Range, °C.: 175-222
Yield, wt %: 6.9
Density @ 15° C., g/cu m: 0.799
Sulfur, wt %: 0.38

Gas oil
Range, °C.: 225-360
Yield, wt %: 21.6
Density @ 15° C., g/cu m: 0.871
Sulfur, wt %: 1.95
Pour pt, °C.: −16
Cold filter pour pt, °C.: −14
Kin. vis., cSt @ 100° C.: 1.42

Heavy gas oil
Range, °C.: 360-460
Yield, wt %: 13.5
Density @ 15° C., g/cu m: 0.935
Sulfur, wt %: 3.57
Kin. vis., cSt @ 100° C.: 5.20

Long residuum
Range, °C.: 360+
Yield, wt %: 55.9
Density @ 15° C., g/cu m: 1.012
Sulfur, wt %: 5.25
Kin. vis., cSt @ 100° C.: 178.2

Short residuum
Range, °C.: 460+
Yield, wt %: 42.4
Density @ 15° C., g/cu m: 1.041
Sulfur, wt %: 5.80
Kin. vis., cSt @ 100° C.: 1,350
Con. carbon, wt %: 22.0
V/Ni, ppm: 212/26
Pen. @ 25° C., 0.1 mm: 180

Basrah Light, Iraq

Marine pipeline to Khor-al-Amaya piled structure in gulf

Crude
Gravity, °API: 33.7
Sulfur, wt %: 1.95
Pour pt, °C.: −15
Kin. vis., cSt @ 10° C.: 15.0
C_4 & lighter, wt %: 1.3

Light SR naphtha
Range, °C.: C_5-65
Yield, wt %: 3.7
Density @ 15° C., g/cu m: 0.646
RON + 0.4 g Pb/1: 83

Heavy SR naphtha
Range, °C.: 65-175
Yield, wt %: 16.2
Density @ 15° C., g/cu m: 0.737
RON + 0.4 g Pb/1: 54
Aromatics, vol %: 10
Naphthenes, vol %: 17

Kerosine
Range, °C.: 175-225
Yield, wt %: 8.2
Density @ 15° C., g/cu m: 0.795
Sulfur, wt %: 0.10

Gas oil
Range, °C.: 225-360
Yield, wt %: 22.9
Density @ 15° C., g/ cu m: 0.843
Sulfur, wt %: 1.20
Pour pt, °C.: −12
CFPP, °C.: −9
Kin. vis., cSt @ 100° C.: 1.35

Heavy gas oil
Range, °C.: 360-525
Yield, wt %: 25.1
Density @ 15° C., g/cu m: 0.916
Sulfur, wt %: 2.41
Kin. vis., cSt @ 100° C.: 8.00

Long residuum
Range, °C.: 360+
Yield, wt %: 47.7
Density @ 15° C., g/cu m: 0.966
Sulfur, wt %: 3.60
Kin. vis., cSt @ 100° C.: 38.5

Short residuum
Range, °C.: 525+
Yield, wt %: 22.6
Density @ 15 °C., g/cu m: 1.020
Sulfur, wt %: 4.70
Kin. vis., cSt @ 100 °C.: 760
Con. carbon, wt %: 18.5
V/Ni, ppm: 80/22

Basrah Medium, Iraq

Mina-al-Bakr sea terminal in Persian Gulf (Khor al Khafja)

Crude
Gravity, °API: 31.1
Sulfur, wt %: 2.58
Pour pt, °C.: −30
Kin. vis., cSt @ 10° C.: 41.0
C_4 & lighter, wt %: 1.6

Light SR naphtha
Range, °C.: C_5-65
Yield, wt %: 3.3
Density, 15° C., g/cu m: 0.64
RON + 0.4, g Pb/l: 80

Heavy SR naphtha
Range, °C.: 65-175
Yield, wt %: 14.9
Density @ 15° C., g/cu m: 0.736
RON + 0.4 g Pb/l: 54
Aromatics, vol %: 10.0
Naphthenes, vol %: 17

Kerosine
Range, °C.: 175-225
Yield, wt %: 7.5
Density @ 15° C., g/cu m: 0.793
Sulfur, wt %: 0.23

Gas oil
Range, °C.: 225-360
Yield, wt %: 22.3
Density @ 15° C., g/cu m: 0.849
Sulfur, wt %: 1.57
Pour pt, °C.: −13
CFPP, °C.: −10
Kin. vis., cSt @ 100° C.: 1.44

Heavy gas oil
Range, °C.: 360-520
Yield, wt %: 21.9
Density @ 15° C., g/cu m: 0.931
Sulfur, wt %: 3.08
Kin. vis., cSt @ 100 ° C.: 8.74

Long residuum
Range, °C.: 360+
Yield, wt %: 50.4
Density @ 15° C., g/cu m: 0.984
Sulfur, wt %: 4.38
Kin. vis., cSt @ 100° C.: 61.7

Short residuum
Range, °C.: 520+
Yield, wt %: 28.5
Density @ 15° C., g/cu m: 1.032
Sulfur, wt %: 5.43
Kin. vis., cSt @ 100° C.: 1,400
Con. carbon, wt %: 19.0
V/Ni, ppm: 175/63
Pen. @ 25° C., 0.1 mm: 180

Belayim, Egypt

Wadi el Feiran, Gulf of Suez

Crude
Gravity, °API: 27.5
Sulfur, wt %: 2.20
Vis., cSt @ 20° C.: 51.27
Pour pt, °C.: +6
Wax content, wt %: 8.0
Rvp, psi: 6.50
Carbon residue, wt %: 7.25
V/Ni, ppm: 79.4/54.6
C_1-C_4, yield, vol %: 2.43

Naphtha
Range, °C.: C_5-82
Yield, vol %: 5.12
RON, clear: 67.0
Ron + 0.4 Pb/l: 80.8

Naphtha
Range, °C.: 82-160
Yield, vol %: 10.15
Paraffins, vol %: 57.0
Napthenes, vol %: 33.0
Aromatics, vol %: 10.0
RON, clear: 47.2

Kerosine
Range, °C.: 160-230
Yield, vol %; 9.36
Gravity, °API: 45.4
Total sulfur, wt %: 0.36
Smoke pt, mm: 24
Aromatics, vol %: 16.7

Gas oil
Range, °C.: 230-350
Yield, vol %: 18.49
Gravity, °API: 34.0
Total sulfur, wt %: 1.47
Vis., cSt @ 20° C.: 6.532
Pour pt, °C: −7
Aniline pt, °C.: 69.2
Diesel index: 53.2

Vacuum distillate
Range, °C.: 350-550
Yield, vol %: 26.94
Gravity, °API: 23.2
Total sulfur, wt %: 2.19
Vis., cSt @ 50° C.: 36.24
Pour pt, °C.: +39
Carbon residue, wt %: 0.65
Basic N, ppm: 540
Total N, ppm: 1,813

Residue
Range, °C.: 350+
Yield, vol %: 54.45
Gravity, °API: 13.5
Total sulfur, wt %: 3.12
Vis., cSt @ 50° C.: 1,508
Pour pt, °C.: +30
Wax content, wt %: 13.7
Carbon residue, wt %: 12.10
V/Ni, ppm: 133.1/91.5

Burgan (Wafra), Divided Zone

Mina Saud, Divided Zone CBM, also Mina Abdulla, Kuwait

Crude
Gravity, °API: 23.3
Sulfur, wt %: 3.37
Pour pt, °F.: −5
Vis., Saybolt @ 122° F.: 134
Con. carbon, wt %: 7.7
Rvp, psi: 3.4
Salt content, lb/1,000 bbl: 17.5
V/Ni, ppm: 34/6.8

Light naphtha
Range, °F.: IBP-200
Yield, vol %: 3.20
Gravity, °API: 77.5
Sulfur, wt %: 0.01
Rvp, psi: 9.6
Paraffins, vol %: 74
Naphthenes, vol %: 25
Aromatics, vol %: 1
RON, clear: 73.1

Heavy naphtha
Range, °F.: 200-435
Yield, vol %: 13.62
Gravity, °API: 49.8
Sulfur, wt %: 0.15
Rvp, psi: 0.2
P/N/A, vol %: 44/36/20
RON, clear: 52.0
RON, + 3 g TEL: 68.0

Kerosine
Range, °F.: 435-500
Yield, vol %: 6.70
Gravity, °API: 38.5
Sulfur, wt %: 0.76
Aromatics, vol %: 37
Freezing pt, °F.: −47
Smoke pt, mm: 18
Aniline pt, °F.: 137.7
Cetane index: 47.3
ASTM, 50% pt, °F.: 456

Gas oil
Range, °F.: 500-620
Yield, vol %: 12.63
Gravity, °API: 32.7
Sulfur, wt %: 1.76
Pour pt, °F.: −5
Aniline pt, °F.: 153.3
Cetane index: 52.0

Residual oil
Range, °F.: 620+
Yield, vol %: 63.45
Gravity, °API: 13.2
Sulfur, wt %: 4.45
Pour pt, °F.: +60
Con. carbon, wt %: 1.5

Residual oil
Range, °F.: 1,048+
Yield, vol %: 34.23
Gravity, °API: 6.2
Sulfur, wt %: 5.43
Con. carbon, wt %: 20.3
V/Ni, ppm: 120/25

Dorrood (Darius), Iran

Kharg Island

Crude
Gravity, °API: 33.6
Sulfur, wt %: 2.35
Rvp, psi: 6.5
H_2S (evolved), wt %: 0.026
Pour pt, °F.: −4.5
Rams. carbon, wt %: 4.6
Kin. vis., cSt @ 100° F.: 5.65
V/Ni, ppm: 23/8
C_1-C_5, vol %: 6.35

Naphtha
Range (TBP), °F.: C_5-200
Yield, vol %: 10.1
Gravity, °API: 81.9
Sulfur, wt %: 0.067
Charac. factor: 12.70
Paraffins, vol %: 85.6
Naphthenes, vol %: 12.2
Aromatics, vol %: 2.2
RON/MON, clear: 61.7/61.1

Naphtha
Range (TBP), °F.: 200-320
Yield, vol %: 12.7
Gravity, °API: 59.0
Sulfur, wt %: 0.088
Charac. factor: 12.07
P/N/A, vol %: 67.5/17.8/14.8
RON/MON, clear: 33.0/ 35.9

Kerosine
Range, °F.: 320-520
Yield, vol %: 18.6
Gravity, °API: 44.9
Sulfur, wt %: 0.462
Charac. factor: 11.88
Aniline pt, °F.: 142.9
Diesel index: 64.1
Cetane index: 46.3
Freeze pt, °F.: −41
Cloud pt, °F.: −44
Pour pt, °F.: −49
Smoke pt, mm: 24
Naphthalenes, vol %: 2.66
Neut. no., mg Kott/g: 0.20
Vis., SUS @ 68° F.: 32.7

Gas oil
Range, °F.: 520-650
Yield, vol %: 11.5
Gravity, °API: 33.7
Sulfur, wt %: 1.68
Charac. factor: 11.76
Aniline pt, °F.: 162.3
Diesel index: 54.6
Cetane index: 49 9
Cloud pt, °F.: 26
Pour pt, °F.: 21
Vis., SUS @ 68° F.: 47.0

Residuum
Range, °F.: 650+
Yield, vol %: 44.6
Gravity, °API: 14.5
Sulfur, wt %: 3.97
Pour pt: °F.: 58
Rams. carbon, wt %: 9.10
Vis., SUS @ 122° F.: 1,494.0
V/Ni, ppm: 45/16

Residuum
Range, °F.: 1,050+
Yield, vol %: 17.9
Gravity, °API: 3.8
Sulfur, wt %: 5.38
Pour pt, °F.: 141
V/Ni, ppm: 101/36

Dubai (Fateh), Dubai, U.A.E.

SBMs in offshore Persian Gulf producing area

Crude
Gravity, °API: 31.05
Total sulfur, wt %: 2.0
Kin. vis., cSt @ 20° C.: 12.82
  @ 40° C.: 7.05
Rvp, bar: 0.419
Pour pt, °C.: −9
Asphaltenes, wt %: 1.70
Con. carbon, wt %: 4.62
V/Ni, ppm: 42/14

Debutanized naphtha
Range, °C.: 15-145
Yield, vol %: 16.4
Gravity °API: 75.0
Vol % position in crude: 2.0-18.4
Total sulfur, ppm: 193
Rvp, bar: 0.44
Paraffins, vol %: 68.4
Naphthenes, vol %: 23.1
Aromatics, vol %: 8.5
RON, clear: 55.6

Kerosine
Range, °C.: 145-230
Yield, vol %: 15.0
Total sulfur, wt %: 0.25
P/N/A, vol %: 50.9/29.9/19.2
Smoke pt, mm: 22
Aniline pt, °C.: 56.0
Diesel index: 62.1
Cetane index: 56.0

Gas oil
Range, °C.: 145-350
Yield, vol %: 36.6
Gravity, °API: 38.6
Total sulfur, wt %: 1.04
Kin. vis., cSt @ 20° C.: 3.02
  @ 40° C.: 1.99
Aniline pt, °C.: 60.8
Diesel index: 54.6
Cetane index: 51.0

Gas oil
Range, °C.: 175-400
Yield, vol %: 39.9
Gravity, °API: 34.1
Total sulfur, wt %: 1.43
UOP factor: 11.65

Residue
Range, °C.: 350+
Yield, vol %: 45.0
Gravity, °API: 14.75
Total sulfur, wt %: 3.0
Kin. vis., cSt @ 50° C.: 351
  @ 100° C.: 31.0
Pour pt, °C.: +19
Con. carbon, wt %: 9.1
V/Ni, ppm: 85/27

Dukhan (Qatar Land), Qatar

Umm Said terminal CBM & SBM

Crude
Gravity, °API: 41.7
Sulfur, wt %: 1.28
H_2S g/100 cc: 0.0283
Pour pt, °F.: −20
Rvp, psi: 11.7
Vis., SSU @ 80° F.: 43.3

Gasoline
Range, °F.: 40-155
Yield, vol %: 8.61
Gravity, °API: 86.5
Sulfur, wt %: 0.02
Paraffins, vol %: 95.0
Naphthenes, vol %: 3.9
Aromatics, vol %: 1.1

Light naphtha
Range, °F.: 155-265
Yield, vol %: 11.74
Gravity, °API: 64.3
Sulfur, wt %: 0.02
P/N/A, vol %: 67.8/19.7/12.5

Heavy naphtha
Range, °F.: 265-350
Yield, vol %: 10.65
Gravity, °API: 52.5
Sulfur, wt %: 0.03

P/N/A, vol %: 64.3/13.9/21.1
Dinaphthenes, vol %: 0.7
Smoke pt, calculated: 22.6

Kerosine
Range, °F.: 350-500
Yield, vol %: 15.83
Gravity, °API: 45.0
Cetane index (calculated): 51.1
Sulfur, wt %: 0.14
Aromatics, vol %: 21.1
Smoke pt: 21.0
Freeze pt, °F.: −42
Pour pt, °F.: −45

Heavy gas oil
Range, °F.: 500-650
Yield, vol %: 15.14
Cetane index (calculated): 55.1
Sulfur, wt %: 1.11
Total N, ppm: 35
Chloride, ppm: < 5.0
Pour pt, °F.: 15

Residue
Range, °F.: 650+
Yield, vol %: 32.66
Gravity, °API: 20.3
Sulfur, wt %: 2.58
Vis., SSU @ 210° F.: 73.2

Residue
Range, °F.: 650-1,000
Yield, vol %: 22.79
Gravity, °API: 24.1
Sulfur, wt %: 2.15
Total N, ppm: 525
Rams. carbon, wt %: 0.23
Vis., SSU @ 210° F.: 46.0

Pitch
Range, °F.: 1,000+
Yield, vol %: 9.87
Sulfur, wt %: 3.45
Con. carbon, wt %: 12.75
V/Ni, ppm: 19/3

Eocene (Wafra), Divided Zone

Mina Saud, Divided Zone CBM, also Mina Abdulla, Kuwait

Crude
Gravity, °API: 18.6
Sulfur, wt %: 4.55
Pour pt, °F.: −20
Vis., Saybolt 122° F.: 80.4
Con. carbon, wt %: 8.9
Rvp, psi: 1.1
Salt content, lb/1,000 bbl: 7.0

Light naphtha
Range, °F.: Ibp-200
Yield, vol %: 1.50
Gravity, °API: 77.6
Sulfur, wt %: 0.12
Rvp, psi: 11.4
Paraffins, vol %: 70
Naphthenes, vol %: 29
Aromatics, vol %: 1
RON, clear: 78.0
ASTM, 50% pt, °F.: 154

Heavy naphtha
Range, °F.: 200-435
Yield, vol %: 11.82
Gravity, °API: 51.0
Sulfur, wt %: 0.27
Rvp, psi: 1.4
P/N/A, vol %: 45/40/15
RON, clear: 48
RON, 3 g TEL: 60
ASTM, 50% pt, °F.: 325

Kerosine
Range, °F.: 435-500
Yield, vol %: 5.97
Gravity, °API: 36.9
Sulfur, wt %: 1.0
Aromatics, vol %: 30
Freezing pt, °F.: −66
Smoke pt, mm: 17
Aniline pt, °F.: 133.2
Cetane index: 43
ASTM, 50% pt, °F.: 458

Gas oil
Range, °F.: 500-620
Yield, vol %: 11.15
Gravity, °API: 31.0
Sulfur, wt %: 1.80
Pour pt, °F.: −30
Aniline pt, °F.: 145.8
Cetane index: 47
ASTM, 50% pt, °F.: 562

Residual oil
Range, °F.: 620+
Yield, vol %: 68.03
Gravity, °API: 10.0
Sulfur, wt %: 4.9
Pour pt, °F.: 60
Con. carbon, wt %: 14.83

Residual oil
Range, °F.: 1,044+
Yield, vol %: 39.75
Gravity, °API: 4.6
Sulfur, wt %: 6.1
Con. carbon, wt %: 22.5
V/Ni, ppm: 135/67

Foroozan (Fereidoon), Iran

Kharg Island

Crude
Gravity, °API: 31.3
Sulfur, wt %: 2.50
Rvp, psi: 5.7
H_2S (evolved), wt %: 0.015
Pour pt, °F.: −35
Neut. no., mg KOH/g: 0.70
Rams. carbon, wt %: 5.4
Kin. vis., cSt @ 68°F.: 15.33
V/Ni, ppm: 36/11
C_1-C_5, vol %: 6.35

Naphtha
Range, °F.: C_5-200
Yield, vol %: 9.9
Gravity, °API: 82.6
Sulfur, wt %: 0.017
Charac. factor: 12.72
Paraffins, vol %: 76.8
Naphthenes, vol %: 21.8
Aromatics, vol %: 1.4
RON/MON, clear: 64.3/62.6

Naphtha
Range, °F.: 200-320
Yield, vol %: 10.5
Gravity, API: 58.1
Sulfur, wt %: 0.056
Charac. factor: 12.02
P/N/A, vol %: 71.6/17.2/11.3
RON/MON, clear: 30.2/32.0

Kerosine
Range, °F.: 320-520
Yield, vol %: 17.7
Gravity, °API: 44.3
Sulfur, wt %: 0.435
Charac. factor: 11.84
Aniline pt, °F.: 145.2
Diesel index, °F.: 64.3
Cetane index: 45.4
Freeze pt, °F.: −41
Cloud pt, °F.: −52
Pour pt, °F.: −52
Smoke pt, mm: 22
Vis., SUS @ 68° F.: 32.4

Gas oil
Range, °F.: 520-650
Yield, vol %: 10.8
Gravity, °API: 33.4
Sulfur, wt %: 1.56
Charac. factor: 11.74
Aniline pt, °F.: 161.2
Diesel index: 53.8
Cetane index: 49.4
Cloud pt, °F.: 20
Pour pt, °F.: 19
Vis., SUS @ 68° F.: 48.0

Residuum
Range, °F.: 650+
Yield, vol %: 48.8
Gravity, °API: 13.6
Sulfur, wt %: 4.13
Pour pt, °F.: 34
Rams. carbon, wt %: 9.86
Vis., SUS @ 122 °F.: 3,616.0
V/Ni, ppm: 66/20

Residuum
Range, °F.: 1,050+
Yield, vol %: 20.4
Gravity, °API: 3.8
Sulfur, wt %: 5.6
Pour pt, °F.: 158
V/Ni, ppm: 143/44

Gulf of Suez Mix, Egypt

Ras Shukheir/3 conventional sea berths

Crude
Gravity, °API: 31.9
Sulfur, wt %: 1.52
Rvp, psi: 8.3
Pour pt, °F.: 35
Rams. carbon, wt %: 4.4
Kin. vis., cSt @ 100° F.: 8.74
V/Ni, ppm: 41/25
C_1-C_5, vol % yield: 5.48

Naphtha
Range (TBP), °F.: C_5-200
Yield, vol %: 7.8
Gravity, °API: 79.1
Total sulfur, wt %: 0.018
Rvp, psi: 10.7
Paraffins, vol %: 80.0
Naphthenes, vol %: 18.0
Aromatics, vol %: 2.0
RON, clear: 69.4
MON, clear: 66.1

Naphtha
Range (TBP), °F.: 200-320
Yield, vol %: 10.0
Gravity, °API: 56.7
Total sulfur, wt %: 0.022
Rvp, psi: 1.1
P/N/A, vol %: 57.3/32.7/10.1
RON, clear: 47.2
MON, clear: 43.9

Kerosine
Range (TBP), °F.: 320-520
Yield, vol %: 17.7
Gravity, °API: 42.6
Total sulfur, wt %: 0.395
Aniline pt, °F.: 138.6
Diesel index: 59.1
Cetane index: 43.0
Freeze pt, °F.: −48
Cloud pt, °F.: −42
Smoke pt, mm: 26
Naphthalenes, vol %: 2.88

Gas oil
Range (TBP), °F.: 520-650
Yield, vol %: 11.3
Gravity, °API: 33.9
Total sulfur, wt %: 1.2
Aniline pt, °F.: 159.1
Diesel index: 53.9
Cetane index: 50.21
Cloud pt, °F.: 26
Vis., SUS @ 68° F.: 49.8

Gas oil
Range (TBP), °F.: 650-850
Yield, vol %: 17.2
Gravity, °API: 27.2
Total sulfur, wt%: 1.6
Rams. carbon, wt %: 0.34

Residuum
Range, °F.: 650+
Yield, vol %: 50.8
Gravity, °API: 17.2
Total sulfur, wt %: 2.365
Rams. carbon, wt %: 7.90
Vis., SUS @ 122° F.: 1,146.9
V/Ni, ppm: 73/46

Hout, Divided Zone

Sea berth off Ras Al Khafji

Crude
Gravity, °API: 32.8
Sulfur, wt %: 1.91
Rvp, psi: 4.6
Pour pt, °F.: −13.0
Kin. vis., cSt @ 86° F.: 9.88
Con. carbon, wt %: 5.01
Asphaltenes, wt %: 1.65
Wax content, wt %: 3.2
Neut. no., mg KOH/g: 0.04
C_1-C_4, vol %: 1.8
V/Ni, ppm: 28/6

Light naphtha
Range (TBP), °F.: C_5-176
Yield, vol %: 6.3
Gravity, °API @ 60° F.: 83.7
Sulfur, wt %: 0.029
H_2S, ppm: 19
Rvp, psi: 10.3
RON, clear: 64.6
RON + 3.0 ml TEL/gal: 84.2
MON, clear: 61.0
Paraffins, vol %: 92.6
Naphthenes, vol %: 6.4
Aromatics, vol %: 1.0

Full range naphtha
Range (TBP), °F.: C_5-374
Yield, vol %: 24.5
Gravity, °API: 63.5
Sulfur, wt %: 0.035
H_2S, ppm: 26
Rvp, psi: 4.3
RON, clear: 44.0
MON, clear: 43.6
Aniline pt, °F.: 134
P/N/A, vol %: 70.8/15.6/13.6

Kerosine
Range, °F.: 374-482
Yield, vol %: 11.3
Gravity, API @ 60° F.: 445
Sulfur, wt %: 0.204
Pour pt, °F.: −49
Cloud pt, °F.: −49
Freeze pt, °F.: −42
Smoke pt, mm: 23.5
Aniline pt, °F.: 147
Saturates, vol %: 81.5
Aromatics, vol %: 18.0
Olefins, vol %: 0.5

Gas oil
Range, °F.: 482-644
Yield, vol %: 15.0
Gravity, °API @ 60° F.: 36.0
Sulfur, wt %: 1.07
Kin. vis. @ 100 °F.: 3.954
Pour pt, °F.: 14
Aniline pt, °F.: 163
Cetane index: 56.5

Residue
Range, °F.: 644+
Yield, vol %: 47.4
Gravity, °API @ 60° F.: 16.4
Sulfur, wt %: 3.39
Kin. vis., cSt @ 122° F.: 360.3
Pour pt, °F.: 68
Con. carbon, wt %: 10.3
V/Ni, ppm: 58/13

Residue
Range, °F.: 1,022+
Yield, vol %: 21.8
Gravity, °API @ 60° F.: 7.9
Sulfur, wt %: 4.39
Kin. vis., cSt @ 210° F.: 118.6
Pour pt, °F.: 91
Con. carbon, wt %: 20.7
Asphaltenes, wt %: 6.42
V/Ni,ppm: 110/31

Iranian Heavy, Iran

Kharg Island

Crude
Gravity, °API: 31.0
Total sulfur, wt %: 1.65
Vis., cSt @ 70° F.: 16.84
Vis., cSt @ 100° F.: 9.36
Pour pt, °F.: −5
C_1-C_4 yield, vol %: 2.38

Gasoline
Range (TBP), °C.: C_5-65
Yield, vol %: 3.49
Sp. gr. 60/60 °F.: 0.6468
RON, clear: 73.0
Paraffins, wt %: 93.5
Naphthenes, wt %: 5.7
Aromatics, wt %: 0.8

Light naphtha
Range, °C.: 65-149
Yield, vol %: 14.53
Sp. gr., 60/60 °F.: 0.7392
Total sulfur, wt %: 0.088
P/N/A, wt %: 53.4/33.1/13.5

Heavy naphtha
Range, °C.: 149-262
Yield, vol %: 18.26
Sp. gr., 60/60 °F.: 0.8041
Total sulfur: 0.289
Freezing pt, °C.: −50.0
Aromatics, vol %: 17.8
Aniline pt, °C.: 59.1
Smoke pt, mm: 23

Gas oil
Range, °C.: 262-352
Yield, vol %: 14.60
Total sulfur, wt %: 1.22
Cloud pt, °F.: 28
Pour pt, °F.: 24
Diesel index: 52

Residue
Range, °C.: 352+
Yield, vol %: 46.74
Total sulfur, wt %: 2.55
Vis., cSt @ 122° F.: 614
Vis, cSt @ 210° F.: 49.8
Con. carbon, wt %: 9.9
Asphaltenes, wt %: 3.8
V/Ni, ppm: 139/58

Assay sample taken at production rate of 1.84 million b/d with following field contributions in b/d:

Ahwaz—700,000
Gachsaran—628,000
Bibi Hakimeh—269,000
Kharg, Kupal, Monsuri and Rag E. Safid—251,000

Iranian Light, Iran

Kharg Island

Crude
Gravity, °API: 33.8
Pour pt, °F.: −20
Total sulfur, wt %: 1.35
Vis., cSt @ 70° F.: 10.58
  @ 130° F.: 4.22

Gasoline
Range, °C.: C_5-65
Yield, vol %: 3.86
Sp. gr. 60/60° F.: 0.6465
RON, clear: 72.4
Paraffins, wt %: 94.4
Naphthenes, wt %: 4.8
Aromatics, wt %: 0.8

Light naphtha
Range, °C.: 65-149
Yield, vol %: 14.17
Sp. gr. 60/60° F.: 0.7387
Total sulfur, wt %: 0.040
P/N/A, wt %: 57.5/31.1/11.4

Heavy naphtha
Range, °C.: 149-262
Yield, vol %: 20.45
Sp. gr., 60/60° F.: 0.8028
Total sulfur, wt %: 0.198
Freezing pt, °C.: −—49
Aromatics, vol %: 18.0
Aniline pt, °C: 60.3
Smoke pt, mm: 24

Gas oil
Range, °C.: 262-352
Yield, vol %: 15.32
Sp. gr. 60/60° F.: 0.8599
Total sulfur, wt %: 1.05
Cloud pt, °F.: 28
Pour pt, °F.: 24
Diesel index: 53

Residue
Range, °C.: 352+
Yield, vol %: 43.3
Sp. gr. 60/60° F.: 0.9531
Total sulfur, wt %: 2.42
Vis., cSt @ 122° F.: 297.0
  @ 210° F.: 29.8
Con. carbon, wt %: 9.0
Asphaltenes, wt %: 1.2
V/Ni, ppm: 70/32

Assay sample taken at production rate of 2.6 million b/d with following field contributions in b/d:

Agha Jari—870,000
Marun—1.03 million
Karanj—356,000
Paris—279,000
Pazanan—33,000

Khafji, Divided Zone

Sea berth off Ras Al Khafji

Crude
Gravity, °API: 28.5
Sulfur, wt %: 2.85

H_2S (dissolved), ppm: <1
Rvp, psi: 7.6
Pour pt, °F.: −31
Kin. vis., cSt @ 86° F.: 21.3
Con. carbon residue, wt %: 8.04
Asphaltenes, wt %: 4.32
Wax content, wt %: 2.7
Neut. no., mg KOH/g: 0.18
C_1-C_4, vol %: 3.41
V/Ni, ppm: 55/16

Light naphtha
Range (TBP), °F.: C_5-176
Yield, vol %: 5.5
Gravity, °API @ 60°F.: 85.2
Sulfur, wt %: 0.0028
Rvp, psi: 10.8
RON, clear: 66.2
RON + 1.0 ml TEL/gal: 78.5
MON, clear; 63.4
Paraffins, vol %: 93.9
Naphthenes, vol %: 5.4
Aromatics, vol %: 0.7

Full range naphtha
Range (TBP), °F.: C_5-374
Yield, vol %: 20.4
Gravity, °API @ 60° F.: 65.0
Sulfur, wt %: 0.0264
Rvp, psi: 4.3
RON, clear: 41.0
RON + 1 ml TEL/gal: 53.1
MON, clear: 41.2
Aniline pt, °F.: 139
P/N/A, vol %: 73.4/15.4/11.2

Kerosine
Range (TBP), °F.: 374-482
Yield, vol %: 9.5
Gravity, °API @ 60° F.: 44.5
Sulfur, wt %: 0.324
Cloud pt, °F.: −45
Freeze pt, °F.: −45
Smoke pt, mm: 23.7
Aniline pt, °F.: 145
Saturates, vol %: 80.5
Aromatics, vol %: 19.0
Olefins, vol %: 0.5

Gas oil
Range (TBP), °F.: 482-644
Yield, vol %: 13.9
Sulfur, wt %: 1.42
Kin. vis. @ 100° F.: 3.9
Pour pt, °F.: 10
Cloud pt, °F.: 10
Aniline pt, °F.: 156
Cetane index: 54.2

Residue
Range (TBP), °F.: 644+
Yield, vol %: 52.8
Gravity, °API @ 60° F.: 12.1
Sulfur, wt %: 4.46
Kin. vis., cSt @ 122° F.: 1,795
Pour pt, °F.: 50
Con. carbon, wt %: 13.4
Asphaltenes, wt %: 7.84
V/Ni, ppm: 95/28

Residue
Range (TBP), °F.: 991+
Yield, vol %: 27.8
Gravity, °API @ 60°F.: 4.5
Sulfur, wt %: 5.65
Kin. vis., cSt @ 210° F.: 6,043
Pour pt, °F.: 145
Con. carbon, wt %: 24.4
Asphaltenes, wt %: 15.4
V/Ni, ppm: 170/49

Kirkuk Blend, Iraq

Mina-al-Bakr sea terminal in Persian Gulf also Ceyhan (Dortyol), Turkey

Crude
Gravity, °API: 35.1
Sulfur, wt %: 1.97
Pour pt, °C.: −22
Kin. vis., cSt @ 10° C.: 12.8
C_4 & lighter, wt %: 1.8

Light SR naphtha
Range, °C.: C_5-65
Yield, wt %: 4.1
Density @ 15° C., g/cu m: 0.644
RON + 0.4 g Pb/l: 81

Heavy SR naphtha
Range, °C.: 65-175
Yield, wt %: 18.1
Density @ 15° C., g/cu m: 0.740
RON + 0.4 g Pb/l: 58.5
Aromatics, vol %: 10.5
Naphthenes, vol %: 22

Kerosine
Range, °C.: 175-225
Yield, wt %: 8.7
Density @ 15° C., g/cu m: 0.794
Sulfur, wt %: 0.19

Gas oil
Range, °C.: 225-360
Yield, wt %: 24.0
Density @ 15° C., g/cu m: 0.843
Sulfur, wt %: 1.18
Pour pt, °C.: −12
Cold filter pour pt, °C.: −9
Kin. vis., cSt @ 100° C.: 1.34

Heavy gas oil
Range, °C.: 360-525
Yield, wt %: 22.9
Density @ 15° C., g/cu m: 0.917
Sulfur, wt %: 2.35
Kin. vis., cSt @ 100° C.: 7.98

Long residuum
Range, °C.: 360+
Yield, wt %: 43.3
Density @ 15° C., g/cu m: 0.968
Sulfur, wt %: 3.76
Kin. vis., cSt @ 100° C.: 42.9

Short residuum
Range, °C.: 525+
Yield, wt %: 20.4
Density @ 15° C., g/cu m: 1.003
Sulfur, wt %: 5.30
Kin. vis., cSt @ 100° C.: 1,550
Con. carbon, wt %: 21.0
V/Ni, ppm: 142/54

Kuwait Export, Kuwait

Mina al Ahmadi

Crude
Gravity, °API: 31.4
Vis., SUV, sec @ 100° F.: 58.1
Pour pt, °F.: +5
Sulfur, wt %: 2.52
Ni/V (calc.), ppm: 8/30
Rvp, psi: 6.7
H_2S, wt %: <0.001
C_1-C_4 (GC analysis), vol %: 3.03

Naphtha
Range, °F.: Over point — 140
Yield, vol %: 3.80
Gravity, °API: 89.7
Sulfur, wt %: 0.04
RON (micro), clear: 71.8
RON + 3 ml TEL: 89.3

Naphtha
Range, °F.: 140-170
Yield, vol %: 2.26
Gravity, °API: 78.6
Sulfur, wt %: 0.02
Aniline pt, °F.: 147.7
RON, clear/+ 3 ml TEL: 58.2/80.40
Paraffins, vol %: 88.5
Monocycloparaffins, vol %: 9.9
Aromatics, total, vol %: 1.6

Heavy naphtha
Range, °F.: 170-310
Yield, vol %: 11.91
Gravity, °API: 62.1
Sulfur, wt %: 0.03
Aniline pt, °F.: 136.2
Paraffins, vol %: 70.1
Monocycloparaffins, vol %: 20.4
Dicycloparaffins, vol %: 0.4
Aromatics, total, vol %: 9.1

Kerosine
Range, °F.: 310-520
Yield, vol %: 18.43
Gravity, °API: 45.9
Pour pt, °F.: −45
Sulfur, wt %: 0.39
Aniline pt, °F.: 142.9
Cetane index: 53.8
Smoke pt, mm: 26

Heating oil
Range, °F.: 520-680
Yield, vol %: 14.89
Gravity, °API: 32.9
Vis., SUV, sec. @ 100° F.: 43.3
Pour pt, °F.: +20
Total N, ppm: 100
Sulfur, wt %: 1.98
Aniline pt, °F.: 160.2
Cetane index: 54.3

Gas oil
Range, °F.: 680-1,000
Yield, vol %: 24.09
Gravity, °API: 21.4
Pour pt, °F.: +100
Sulfur, wt %: 3.12
Total N, ppm: 900
Ni/V, ppm: <0.1/<0.1
Vis., SUV, sec @ 130° F.: 175.2
Rams. carbon residue, wt %: 0.47

Residuum
Range (VEFV), °F.: 1,000+
Yield, vol %: 21.78
Gravity, °API: 5.8
Sulfur, wt %: 5.11
V/Ni, ppm: 116/34
Vis., SUV, sec @ 250° F.: 3,394
Rams. carbon residue, wt %: 21.9

Mubarek, Sharjah, U.A.E.

Floating storage and loading facility in offshore producing area

Crude
Gravity, °API: 37
Sulfur, wt %: 0.62
Rvp, psi: 4.8
Pour pt, °F.: 10
Salt, lb/1,000 bbl: 23
Vis., cSt @ 100° F.: 3.20
@ 122° F.: 2.80
Gas, vol % of crude: 0.7

Light straight run
Range, °F.: ibp-220
Yield, vol %: 12.7
Octane, F-1 clear: 68.2
Gravity, °API: 72.2
Rvp, psi: 11.8
Sulfur, wt %: 0.01

Light naphtha
Range, °F.: 220-300
Yield, vol %: 9.1
Paraffins, vol %: 51.6
Naphthenes, vol %: 30.4
Aromatics, vol %: 18.0
Octane, F-1 clear: 50.5
Gravity, °API: 55.2
Sulfur, wt %: 0.01

Heavy naphtha
Range, °F.: 300-360
Yield, vol %: 7.2
P/N/A, vol %: 48.5/28.8/22.7
Gravity, °API: 49.9
Sulfur, wt %: 0.01

Kerosine
Range, °F.: 360-500
Yield, vol %: 17.6
Gravity, °API: 42.7
Smoke pt, mm: 25
Aniline pt, °F.: 134
Diesel index: 57.2
Pour pt, °F.: −55
Sulfur, wt %: 0.04
Vis., cSt @ 100° F.: 1.40

Light gas oil
Range, °F.: 500-700
Yield, vol %: 21.4
Gravity, °API: 32.6
Aniline pt, °F.: 156
Diesel index: 50.9
Pour pt, °F.: 20
Rams. carbon residue, wt %: 0.66
Sulfur, wt %: 0.66
Vis., cSt @ 100° F.: 4.55
@ 210° F.: 1.54
Bromine no.: 0.6

Residuum
Range, °F.: 700+
Yield, vol %: 30.8
Gravity, °API: 19.6
Rams. carbon residue, wt %: 4.74
Sulfur, wt %: 1.18

Residuum
Range, °F.: 1,000+
Yield, vol %: 9.2
Gravity, °API: 12.2
Rams. carbon residue, wt %: 15.09
Sulfur, wt %: 1.43
V/Ni, ppm: 11.40/6.0

Murban, Abu Dhabi

Port of Jebel Dhanna/4 CBM berths

Crude
Gravity, °API: 40.45
Rvp @ 37.8° C., psia: 3.46
Pour pt, °C.: −24
Kin. vis., cSt @ 40° C.: 2.70
Sulfur, wt %: 0.78
V/Ni, ppm: <0.1/0.7
Con. carbon, wt %: 1.35
Charac. factor, K_{UOP}: 12.1

Naphtha
Range (TBP), °C.: 20-165
Yield, vol %: 27.4
Position on crude, vol %: 1.9-29.3
Gravity, °API: 63.47
Sulfur, ppm: 43
RON, clear: 50

Naphtha
Range (TBP), °C.: 20-180
Yield, vol %: 31.2
Position on crude, vol %: 1.9-33.1
Gravity, °API: 61.48
Sulfur, ppm: 64
RON, clear: 47

Kerosine
Range (TBP), °C.: 150-220
Yield, vol %: 16.6
Position on crude, vol %: 25.3-41.9
Gravity, °API: 18.22
Smoke pt, mm: 24
Freeze pt, °C.: −46
Aromatics, vol %: 21
Aniline pt, °C.: 55.2
Sulfur, wt %: 0.022

Diesel
Range (TBP), °C.: 220-350
Yield, vol %: 26.0
Gravity, °API: 37.37
Sulfur, wt %: 0.62
Cloud pt, °C.: −12
Pour pt, °C.: −12
Vis., cSt @ 100° C.: 1.25
Aniline pt, °C.: 72.3
Diesel index: 60.6
Cetane index: 60
Con. carbon on 10% residue, wt %: <0.01

Residuum
Range (TBP), °C.: 350+
Yield, vol %: 32.1
Gravity, °API: 22.72
Sulfur, wt %: 1.73
Vis., cSt @ 100° C.: 10.85
Con. carbon, wt %: 4.3
Asphaltenes, wt %: 0.15
Pour pt, °C.: +33
V/Ni, ppm: 0.4/2.0
Flash pt, °C.: 214
Nitrogen, wt %: 0.125

Residuum
Range (TBP), °C.: 540+
Yield, vol %: 9.3
Gravity, °API: 13.99
Sulfur, wt %: 2.20
Vis., cSt @ 50° C.: 3,340.
Con. carbon, wt %: 11.5
Asphaltenes, wt %: 0.74

Oman Export, Oman

Mina al Fahal

Crude
Gravity, °API: 36.3
Sulfur, wt %: 0.79
Pour pt, °F.: −15
Rvp, psi: 4.2
Vis., SUS @ 60° F.: 64.8
Yield, ibp to 113 °F., vol %: 3.63

Fraction yields (partial)
Range/vol %:
390-450/6.73
450-500/5.74
500-550/5.64
550-650/10.76

Straight run
Range, °F.: 113-220
Yield, vol %: 7.54
Gravity, °API: 70.4
RON + 3 cc Pb: 74.2
Sulfur, wt %: 0.0
Paraffins, vol %: 77.0
Naphthenes, vol %: 18.24
Aromatics, vol %: 4.8

Naphtha
Range, °F.: 220-390
Yield, vol %: 17.77
Gravity, °API: 55.3
Sulfur, wt %: 0.03
P/N/A, vol %: 67.6/21.3/10.1
Dinaphthenes, vol %: 1.0

Kerosine
Range, ° F.: 315-500
Yield, vol %: 20.56
Gravity, °API: 46.5
Sulfur wt %: 0.12
Aromatics, vol %: 12.9
Smoke pt, mm: 26
Freeze pt, °F.: −56
Pour pt, °F.: −70

Light gas oil
Range, °F.: 450-650
Yield, vol %: 22.14
Gravity, °API: 37.5
Cetane index: 57.0
Sulfur, wt %: 0.42
Total N, ppm: 31
Aniline pt, °F.: 168.3
Pour pt, °F.: −15

Heavy gas oil
Range, °F.: 650-1,000
Yield, vol %: 26.15
Gravity, °API: 26.8
Sulfur, wt %: 0.98
Total N, ppm: 516
Pour pt, °F.: 70
Carbon residue, wt %: 0.14

Flashed residue
Range, °F.: 1,000+
Yield, vol %: 16.03
Gravity, °API: 14.2
Sulfur, wt %: 1.96
Vis., SSF @ 210 °F.: 196.0

Qatar Marine, Qatar

Halul Island

Crude
Gravity, °API: 35.3
Sulfur, wt %: 1.57
Pour pt, °F.: 10
H_2S g/100 cc: 0.0315
Vis., SSU @ 60° F.: 53.4

Light straight run
Range, °F.: 40-155
Yield, vol %: 6.45
Gravity, °API: 82.5
Sulfur, wt %: 0.05
P/N/A, vol %: 88.7/9.5/1.7

Light naphtha
Range, °F.: 155-265
Yield, vol %: 9.45
Sulfur, wt %: 0.03
Paraffins, vol %: 60.6
Naphthenes, vol %: 23.3
Aromatics, vol %: 16.1

Heavy naphtha
Range, °F.: 265-350
Yield, vol %: 10.07
Gravity, °API: 51.8
Sulfur, wt %: 0.04
P/N/A: 56.7/18.5/22.9
Dinaphthenes, vol %: 1.9

Kerosine
Range, °F.: 350-500
Yield, vol %: 16.28
Gravity, °API: 43.1
Cetane index (calculated): 47.5
Sulfur, wt%: 0.18
Aromatics, vol %: 24.0
Smoke pt, mm: 19.0
Freeze pt, °F.: −44
Pour pt, °F.: −50

Heavy gas oil
Range, °F.: 500-650
Yield, vol %: 15.50
Cetane index (calculated): 51.6
Sulfur, wt %: 1.24
Total N, ppm: 72
Pour pt, °F.: 25

Residue
Range, °F.: 650+
Yield, vol %: 39.53
Gravity, °API: 16.5
Sulfur, wt %: 2.73
Vis., SUS @ 210° F.: 121.5

Residue
Range, °F.: 1,000+
Yield, vol %: 19.33
Gravity, °API: 10.3
Sulfur, wt %: 3.4
Con. carbon, wt %: 12.5
V/Ni, ppm: 31/7

Rostam, Iran

Lavan Island terminal

Crude
Gravity, °API: 35.9
Vis., cSt @ 50° C.: 3.08
Pour pt, °C.: −22.5
Sulfur, wt %: 1.55
NaCl, wt%: 0.036

Gasoline
Range, °F.: Ibp-165
Yield, vol %: 24.2
RON, clear: 61.4

Kerosine
Range, °C.: 165-220
Yield, vol %: 11.2

Gas oil
Range, °C.: 220-310
Yield, vol %: 17.3

Residuum
Yield, vol %: 45.8
Pour pt, °C.: +12.5
Sulfur, wt %: 2.82
Carbon, wt %: 6.25

Note: Same assay first published in 1976.

Salmon (Sassan), Iran*

Levan Island

Crude
Gravity, °F.: 33.9
Paraffin, wt%: 1.9
Sulfur, wt %: 1.91
Pour pt, °F.: −5
Vis., SUS @ 77° F.: 52.1
  @100° F.: 44.2
Bs&w: 17,550

Straight-run gasoline
Range, vapor-cut points, °F.: 50-200
Yield, vol %: 10.5
Gravity, °API: 77.6
Sulfur, wt %: 0.081
Mercaptan sulfur: 0.067
Octane no., F-1 clear: 61.0

Naphtha
Range, VCP, °F.: 200-375
Yield, vol %: 16.4
Gravity, °API: 53.3
Sulfur, wt %: 0.0820
Mercaptan S, wt %: 0.002
Aniline pt, °F.: 121.5
Octane no., F-1 clear: 35.4
Arom. + naphthenes, vol %: 41

Kerosine
Range VCP, °F.: 375-450
Yield, vol %: 7.5
Gravity, °API: 45.1
Sulfur, wt %: 0.19
Freezing pt, °F.: −50
Aniline pt, °F.: 137.9
Smoke pt, mm: 20
Kin. vis., cSt @ 60° F.: 2.05
  @ 100° F.: 30

Gas oil
Range VCP, °F.: 450-700
Yield, vol %: 23.8
Gravity, °API: 34.1
Sulfur, wt %: 1.2
Pour pt, °F.: +15
Aniline pt, °F.: 153.3
Kin. vis., cSt @ 60° F.: 7.52
  @ 100° F.: 4.03
Cetane no.: 56.3

Residual oil
Range VCP, °F.: 700+
Yield, vol %: 39.7
Gravity, °API: 15.3
Sulfur, wt %: 3.5
Pour pt, °F.: +75
Vis., SUS @ 210° F.: 154
  @ 275° F.: 67.8
V + Ni, ppm: 44

Residual oil
Range, VCP, °F.: 1,070+
Yield, vol %: 12.0
Gravity, °API: 1.3
Sulfur, wt %: 5.0
Vis., SUS @ 210° F.: 8,000
  @ 275° F.: 1,000
V + Ni, ppm: 127

* New assay not available. This one first published in OGJ in 1976. Sassan is produced from same reservoir as Abu Al Bu Khoosh.

Sirri, Iran

Offshore terminal in Persian Gulf producing area

Crude
Gravity, °API: 30.9
Kin. vis., cSt @ 10° C.: 20.3
  @ 37.8° C.: 7.36
Pour pt, °C.: −9
Total sulfur, wt %: 2.3

Rvp, bars: 0.650
Paraffins, wt %: 3.43
Asphaltenes, wt %: 1.48
V/Ni/Fe, ppm: 41/12/3
Yield C_1—C_5, vol %: 7.14

Light gasoline
Range, °C.: C_5-80
Yield, vol %: 5.19
RON, clear: 64.1
Total sulfur, wt %: 0.0080

Heavy gasoline
Range, °C.: 80-180
Yield, vol %: 15.28
Paraffins, vol %: 59.0
Naphthenes, vol %: 30.0
Aromatics, vol %: 11.0
Sulfur, wt %: 0.078

Kerosine
Range, °C.: 180-225
Yield, vol %: 7.54
Smoke pt, mm (150°-225° C.): 18.50
Sulfur, wt %: 0.436

Gas oil
Range, °C.: 180-350
Yield, vol %: 29.61
Pour pt, °C.: −21
Total sulfur, wt %: 1.42
Aniline pt, °C.: 62.2
Diesel index (calculated): 51.9

Residue
Range, °C.: 350+
Yield, vol %: 46.33
Pour pt, °C.: +21
Kin. vis., cSt @ 50° C.: 375
  @ 70° C.: 120
Total sulfur, wt %: 3.65
Asphaltenes, wt %: 3.01
Con. carbon, wt %: 9.53
V/Ni/Fe, ppm: 70/20/4

Soroosh (Cyrus), Iran

Offshore terminal with SBM in production area

Crude
Gravity, °API: 18.1
Sulfur, wt %: 3.3
Rvp, psi: 0.3
H_2S (evolved), wt %: 0.007
Pour pt, °F.: 10
Neut. no., mg KOH/g: 0.50
Rams. carbon, wt %: 12.2
Kin. vis., cSt @ 68° F.: 1,381.4
V/Ni, ppm: 101/35
C_1-C_5, vol %: 1.32

Naphtha
Range, °F.: C_5-200
Yield, vol %: 3.3
Gravity, °API: 77.3
Sulfur, wt %: 0.008
Charac. factor: 12.49
Paraffins, vol %: 69.1
Naphthenes, vol %: 29.7
Aromatics, vol %: 1.1
RON/MON, clear: 73.5/70.6

Naphtha
Range, °F.: 200-320
Yield, vol %: 5.1
Gravity, °API: 57.8
Sulfur, wt %: 0.021
Charac. factor: 12.00
P/N/A, vol %: 49.0/42.2/8.8
RON/MON, clear: 49.9/50.5

Kerosine
Range, °F.: 320-520
Yield, vol %: 11.6
Gravity, °API: 42.5
Sulfur, wt %: 0.37
Charac. factor: 11.76
Aromatics, vol %: 15.7
Aniline pt, °F.: 140.8
Diesel index: 59.8
Cetane index: 44.6
Freeze pt, °F.: −46
Cloud pt, °F.: −41
Pour pt, °F.: −55
Smoke pt, mm: 25
Neut no., mg KOH/g: 0.10
Vis., SUS @ 68° F.: 32.6

Gas oil
Range, °F.: 520-650
Yield, vol %: 9.6
Gravity, °API: 33.0
Sulfur, wt %: 1.19
Charac. factor: 11.72
Aniline pt, °F.: 152.9
Diesel index: 50.5

Cetane index: 49.0
Cloud pt, °F.: 11
Pour pt, °F.: 6
Naphthalenes, vol %: 13.68
Vis., SUS @ 68 °F.: 47.9

Residuum
Range, °F.: 650°
Yield, vol %: 70.1
Gravity, °API: 9.2
Sulfur, wt %: 4.3
Pour pt, °F.: 99
Rams. carbon, wt %: 16.31
Vis., SUS @ 210° F.: 1,439.8
V/Ni, ppm: 135/47

Residuum
Range, °F.: 1,050+
Yield, vol %: 36.5
Gravity, °API: −0.2
Sulfur, wt %: 5.6
Pour pt, °F.: 213
V/Ni ppm: 237/82

Souedie, Syria

Tartus/CBMs

Crude
Gravity, °API: 24.9
Sulfur, wt %: 3.82
Pour pt, °C.: −30
Kin. vis. @ 10° C.: 88.3
C_4 & lighter: 0.8

Light SR naphtha
Range, °C.: C_5-65
Yield, wt %: 3.2
Density @ 15° C., g/cu cm: 0.647
RON + 0.4 g Pb/l: 79.5

Heavy SR naphtha
Range, °C.: 65-175
Yield, wt %: 13.1
Density @ 15° C., g/cu m: 0.734
RON + 0.4 g Pb/l: 58
Naphthenes, vol %: 18
Aromatics, vol %: 10.5

Kerosine
Range, °C.: 175-225
Yield, wt %: 6.0
Density @ 15° C., g/cu m: 0.798
Sulfur, wt %: 0.38

Gas oil
Range, °C.: 225-360
Yield, wt %: 19.7
Density @ 15° C., g/cu m: 0.865
Sulfur, wt %: 2.50
Pour pt, °C.: −14
CFPP, °C.: −11
Kin. vis., cSt @ 100° C.: 1.40

Heavy gas oil
Range, °C.: 360-425
Yield, wt %: 9.8
Density @ 15° C., g/cu m: 0.925
Sulfur, wt %: 3.90
Kin. vis., cSt @ 100° C.: 4.3

Long residuum
Range, °C.: 360+
Yield, wt %: 57.2
Density @ 15° C., g/cu m: 1.015
Sulfur, wt %: 5.90
Kin. vis., cSt @ 100° C.: 330.0

Short residuum
Range, °C.: 425+
Yield, wt %: 47.4
Density @ 15° C., g/cu m: 1.040
Sulfur, wt %: 6.0
Kin. vis., cSt @ 100° C.: 1,800
Con. carbon residue, wt %: 21.5
V/Ni, ppm: 185/60

Umm Shaif (Abu Dhabi Marine), Abu Dhabi

Das Island

Crude
Gravity, °API: 37.4
Sulfur, wt %: 1.51
Pour pt, °C.: −30
Rvp @ 37.8° C., psia: 7.05
H_2S, ppm: <2
Asphalt, wt %: 0.13

Light naphtha
Range (TBP), °C.: C_5-80
Yield, vol %: 8.2
Gravity, °API: 83.1
Charac. factor K: 12.73
Sulfur, ppm : 1,030
RON, clear: 65
RON + 1.5 ml/v.s. gal TEL: 74.5
MON, clear: 61

Heavy naphtha
Range (TBP), °C.: 80-150
Yield, vol %: 13.7
Gravity, °API: 59.26
Sulfur, wt %: 0.052

Kerosine
Range (TBP), °C.: 150-230
Yield, vol %: 15.8
Gravity, °API: 47.53
Freeze pt, °C.: −53.0
Aniline pt, °C.: 54.6
Aromatics, vol %: 21.0
Smoke pt, mm: 23.0
Sulfur, wt %: 0.095

Diesel
Range (TBP), °C.: 230-375
Yield, vol %: 25.8
Gravity, °API: 34.49
Sulfur, wt %: 1.18
Pour pt, °C.: −12
Aniline pt, °C.: 69.6
Diesel index: 54.8
Cetane index: 51.2

Residue
Range (TBP), °C.: 350+
Yield, vol %: 37.4
Gravity, °API: 19.1
Kin. vis., cSt @ 50° C.: 104.7
Pour pt, °C.: +27
Sulfur, wt %: 2.78
Asphaltenes, wt %: 0.1
Con. carbon, wt %: 5.3
V/Ni, ppm: 7.1/1.9

Residue
Range (TBP), °C.: 550+
Yield, vol %: 12.3
Gravity, °API: 10.15
Kin. vis., cSt @ 100° C.: 315
Pour pt, °C.: +21
Sulfur, wt %: 3.73
Asphaltenes, wt %: 0.24
Con. carbon, wt %: 14.4
V/Ni, ppm: 19.0/5.0

Zakum (Lower Zakum/ Abu Dhabi Marine), Abu Dhabi

Das Island

Crude
Gravity, °API: 40.6
Rvp @ 37.8 °C., psia: 8.37
Pour pt, °C.: −21
Kin. vis., cSt @ 20° C.: 4.28
Sulfur, wt %: 1.05
Charac. factor, K_{UOP}: 12.28
Asphaltene content, wt %: 0.05

Light straight run
Range (TBP), °C.: C_5-80
Yield, vol %: 8.6
Gravity, API: 82.7
Rvp @ 100 °F., psia: 11.6
Sulfur, ppm: 1.5
RON, clear: 66
MON, clear: 64

Naphtha
Range (TBP), °C.: C_5-160
Yield, vol %: 25.60
Gravity, °API: 66.5
Sulfur, ppm: 16.0

Kerosine
Range (TBP), °C.: 160-250
Yield, vol %: 18.8
Gravity, °API: 46.15
Kin. vis., cSt @ −20° C.: 4.10
Freeze pt, °C.: −48
Aniline pt, °C.: 58
Aromatics, vol %: 21.7
Smoke pt, mm: 23.5
Sulfur wt %: 0.063

Diesel
Range (TBP), °C.: 190-343
Yield, vol %: 29.30
Gravity, °API: 39.52
Sulfur, wt %: 0.52
Cloud pt, °C.: −18
Pour pt, °C.: −21
Vis., cSt @ 40° C.: 2.20
Aniline pt, °C.: 66.8
Diesel index: 60.2
Cetane index: 56.5

Residue
Range, °C.: 350+
Yield, vol %: 33.7
Gravity, °API: 21.8
Kin. vis., cSt @ 50° C.: 69.1
Pour pt, °C.: +33
Sulfur, wt %: 2.2
Asphaltenes, wt %: 0.2
Con. carbon, wt %: 4.0
V/Ni, mg/kg: 1.0/0.9

Residue
Range, °C.: 550+
Yield, vol %: 10.10
Gravity, °API: 13.2
Kin. vis., cSt @ 100° C.: 147.6
Pour pt, °C.: +18
Sulfur, wt %: 2.96
Asphaltenes, wt %: 1.0
Con. carbon, wt %: 13.6
V/Ni, mg/kg: 3.0/2.5

North Sea

Argyll, U.K. North Sea

SBM in producing area

Crude
Density @ 15° C.: 0.8349
Sulfur, wt %: 0.18
Pour pt, °C.: +6
Vis., cSt @ 40° C.: 4.79

Naphtha
Range, °C.: Ibp—175
Yield, vol %: 25.2
Density @ 15° C.: 0.728
Sulfur, wt %: <0.001

Kerosine
Range, °C.: 175-260
Yield, vol %: 14.9

Density @ 15° C.: 0.804
Sulfur, wt %: 0.03
Copper strip test: 1.A
Smoke pt, mm: 22
Freeze pt, °C.: —37

Gas oil
Range, °C.: 260-360
Yield, vol %: 18.9
Density @ 15° C.: 0.839
Sulfur, wt %: 0.11
Cetane index: 64.5
Cloud pt, °C.: 0
Pour pt, °C: —3
Cold filter pt, °C.: —2
Vis., cSt @ 40° C.: 4.45

Residue
Range, °C.: 360+
Yield, vol %: 40.6
Density @ 15° C.: 0.9136
Sulfur, wt %: 0.34
V/Ni/Fe, ppm: 3.9/2.1/2.7
Pour pt, °C: +30
Vis., cSt @ 100° C.: 17.19

Auk, U.K. North Sea

SBM in producing area

Crude
Gravity, °API @ 60° F.: 37.15
Sulfur, wt %: 0.45
Wax, wt %: 6.5
Pour pt (ASTM max.), °C./°F.: +9/+50
Kin. vis., cSt @ 40° C.: 4.38
H_2S existent/potential ppm: <1/<1
Acid value, mg KOH/g (TAN): 0.13
Rvp, lb: 6
C_4—, vol %/wt %: 2.2/1.5

Gasoline
Range, °C.: C_5—85
Yield, vol %/wt %: 8.0/6.5
Sp gr @ 15° C.: 0.685
RON, clear: 66
RON + 0.5 g Pb/l Pb: 82

Naphtha
Range, °C.: 85-165
Yield, vol %/wt %: 15.5/14.0
Sp gr @ 15° C.: 0.755
Sulfur, wt %: 0.002
P/N/A, wt %: 51/34/15

Kerosine
Range, °C.: 165-235
Yield, vol %/wt %: 13.0/12.5
Sp gr @ 15° C.: 0.802
Sulfur, wt %: 0.01
Smoke pt, mm: 25
Aromatics, vol %: 19

Gas oil
Range, °C.: 235-300
Yield, vol %/wt %: 12.5/12.4
Sp gr @ 15° C.: 0.828
Sulfur, wt %: 0.09
Cetane no.: 60
Cloud pt, °C: —19

Gas oil
Range, °C.: 300-350
Yield, vol %/wt %: 9.4/9.6
Sp gr @ 15° C.: 0.847
Sulfur, wt %: 0.35
Cetane no.: 63
Cloud pt, °C.: +9
Kin. vis., cSt @ 40° C.: 5.53

Residue
Range, °C.: 350+
Yield, vol %/wt %: 39.2/43.5
Sp gr @ 15° C.: 0.932
Sulfur, wt %: 0.93
Wax, wt %: 13
Pour pt, °C.: +45
Kin vis., cSt @ 60° C.:96.7

@ 100° C.: 20.7
Acid value: 0.15
Asphaltenes, wt %: 4.0
Con. car. residue: 7%
V/Ni, ppm: 14/3

Beatrice, U.K. North Sea

Nigg Bay terminal

Crude
Gravity, °API: 38.7
Sulfur, wt %: 0.05
Pour pt, °F.: 55
Rvp, psi.: 5.60
Vis., cSt @ 104° F.: 6.85
@ 122° F.: 5.15
C_1—C_5, yield, vol %: 3.77

Light naphtha
Range, VT °F.: 68-158
Yield, vol %: 3.6
Gravity, °API: 86.5
Rvp, psi: 7.9
RON, clear: 64.6
MON, clear: 63.2
Paraffins, vol %: 93.1
Naphthenes, vol %: 6.2
Aromatics, vol %: 0.7

Naphtha
Range, °F.: 158-212
Yield, vol %: 3.5
Gravity, °API: 67.0
Total sulfur, wt %: 0.0002
P/N/A, vol %: 63.7/32.0/4.3

Heavy naphtha
Range, °F.: 212-302
Yield, vol %: 7.3
Gravity, °API: 59.4
Total sulfur, wt %: 0.0004
P/N/A vol %: 69.2/18.6/12.2

Kerosine
Range, °F.: 302-401
Yield, vol %: 8.8
Gravity, °API: 52.4
Total sulfur, wt %: 0.0024
Smoke point, mm: 37
Freeze pt, °F.: —67
Cloud pt, °F.: —70
Pour pt, °F.: —75
Aniline pt, °F.: 148.4
Diesel index: 78
Aromatics, vol %: 8.5
Vis., cSt @ 100° F.: 1.08
@ 210° F.: 0.59

Middle distillate
Range, °F.: 401-509
Yield, vol %: 10.8
Gravity °API: 44.6
Total sulfur, wt %: 0.0081
Aniline pt, °F.: 163.9
Diesel index: 73
Cetane index: 59
Cloud pt, °F.: —4
Pour pt, °F.: —10
Vis., cSt @ 100° F.: 1.89
@ 212° F.: 0.88

Middle distillate
Range, °F.: 401-650
Yield, vol %: 25.8
Gravity, °API: 41.7
Total sulfur, wt %: 0.0191
Aniline pt, °F.: 176.8
Diesel index: 74
Cetane index: 65
Cloud pt, °F.: 38
Pour pt, °F.: 35
Vis., cSt @ 212° F.: 1.21

Gas oil
Range, °F.: 650-1,049
Yield, vol %: 34.7
Gravity, °API: 31.5
Total sulfur, wt %: 0.061
Aniline pt, °F.: 221.3
Con. carbon, wt %: 0.14
Pour pt, °F.: 105
Vis., cSt @ 212° F.: 5.03
V/Ni/Fe, wt ppm: 0.13/0.03/0.18

Residue
Range, °F.: 1,049+
Yield, vol %: 14.4
Gravity °API: 18.7
Total sulfur, wt %: 0.15
Con. carbon, wt %: 9.3
Vis., cSt @ 212° F.: 150
V/Ni/Fe, wt ppm: 0.95/4.20/16.50

Beryl, U.K. North Sea

SBM in producing area

Crude
Gravity, °API: 36.5
Kin. vis., cSt @ 59° F.: 9.47
Con. carbon residue, wt %: 1.3
Sulfur, wt %: 0.42
Rvp, psi: 5.2
V/Ni, ppm: 3.7/0.8
C_5 & lighter, vol %: 4.27

Naphtha
Range (TBP), °F.: 60-120
Yield, vol %: 2.29
Rvp, psi: 17.5
Paraffins, vol %: 97.5
Naphthenes, vol %: 2.5
Aromatics, vol %: 0.0
RON, clear: 80.5

Naphtha
Range, °F.: 120-330
Yield, vol %: 21.89
Sp gr, 60°/60° F.: 0.7519
Rvp, psi: 2.5
P/N/A, vol %: 48.7/33.8/17.6
RON, clear: 61.4
RON + 3 ml TEL: 81.6
Sulfur, wt %: 0.0014
Nitrogen, ppm: 2.2

Kerosine
Range, °F.: 330-425
Yield, vol %: 10.70
Sp gr: 0.7976
P/N/A, vol %: 42.5/36.4/21.1
Sulfur, wt %: 0.0168

Light gas oil
Range, °F.: 425-650
Yield, vol %: 24.75
Sp gr: 0.8441
Gravity, °API: 36.1
Pour pt, °F.: 5
Aniline pt, °F.: 155.5
Diesel index: 56
Cetane index: 51
Sulfur, wt %: 0.21

Heavy gas oil
Range, °F.: 650-995
Yield, vol %: 25.89
Gravity, °API: 26.1
Sp gr: 0.8981
Pour pt, °F.: 95
Kin. vis., cSt @ 100° F.: 38.30
Aniline pt, °F.: 190.8
Total nitrogen, ppm: 1,317

Residue
Range, °F.: 995+
Yield, vol %: 12.95
Gravity, °API: 14.4
Sp gr, 60/60° F.: 0.9698
Pour pt, °F.: 120
Kin. vis., cSt @ 100° F.: 14,827.95
Sulfur, wt %: 1.04
Con. carbon, wt %: 8.80
V/Ni, ppm: 24.0/5.7

Residue
Range, °F.: 650+
Yield, vol %: 38.85
Gravity, °API: 22.0
Sp gr: 0.9220
Pour pt, °F.: 100
Kin. vis., cSt @ 100° F.: 190.47
Sulfur, wt %: 0.78
Total nitrogen, ppm: 2,258
Con. carbon, wt %: 3.14
V/Ni, ppm: 8.4/2.0

Brae, U.K. North Sea

Scheduled to join Forties system in mid 1983

Crude
Gravity, °API: 33.6
Sulfur, wt %: 0.73
Vis., cSt @ 10° C.: 13.6
Pour pt., °C.: —6
Carbon residue, wt %: 2.3
Asphaltenes, wt %: 0.35
V/Ni, ppm wt: 2.5/0.4
C_1—C_4, wt %: 2.15

Gasoline
Range (TBP), °C.: C_5—95
Yield, vol %: 9.25
Density @ 15° C., kg/l: 0.6985

Naphtha
Range, °C.: C_5—149
Yield, vol %: 21.45
Density @ 15° C., kg/l: 0.7405
Sulfur, wt %: 0.0005
P/N/A, wt %: 51.4/30.9/25.6

Kerosine
Range, °C.: 149-232
Yield, vol %: 15.2
Density @ 15° C., kg/l: 0.8125
Sulfur, wt %: 0.034
Aromatics, vol %: 25.7
Smoke pt, mm: 21
Cold test, °C.: —62
Aniline pt, °C.: 45.5
Diesel index: 49
Cetane index: 40

Gas oil
Range, °C.: 232-342
Yield, vol %: 21.3
Density @ 15° C., kg/l: 0.864
Sulfur, wt %: 0.55
Cloud pt, °C.: —15
Pour pt, °C.: —18
Acidity, mg KOH/g: 0.02
Aniline pt, °C.: 60.6
Diesel index: 45
Cetane index: 47

Residue
Range, °C.: 342+
Yield, vol %: 39.3
Density @ 15° C., kg/l: 0.9435
Sulfur, wt %: 1.41
Vis., cSt @ 50° C.: 128
Pour pt, °C.: 36
Carbon residue, wt %: 5.5
Asphaltenes, wt %: 0.75
V/Ni, ppm wt: 6.5/0.9

F.C.C. feed
Range, °C.: 369-509
Yield, vol %: 20.55
Density @ 15° C., kg/l: 0.921
Vis., cSt @ 100° C.: 7.22
Wax, wt %: 14
Aniline pt, °C.: 79.2

Note: Assay run on preproduction crude sample.

Brent, U.K. North Sea

Brent system to Sullom Voe and SPAR in producing area

Crude
Gravity, °API @ 60° F.: 38.16
Sulfur, wt %: 0.26
Wax, wt %: 6.5
Pour pt (ASTM max.), °C.: —3
Kin. vis., @ 40° C., cSt: 3.72
H_2S existent/potential, ppm: <1/<1
Acid value, mg KOH/g (TAN): 0.05
Rvp, lb: 8.5
C_4—, vol %: 3.2

Gasoline
Range, °C.: C_5—85
Yield, vol %: 7.5
Sp gr @ 15° C.: 0.692
RON, clear: 71
RON + 0.5 g Pb/l Pb: 85

Naphtha
Range, °C.: 85-165
Yield, vol %: 17.7
Sp gr @ 15° C.: 0.769
Sulfur, wt %: 0.003
P/N/A, wt %: 42/34/24

Kerosine
Range, °C.: 165-235
Yield, vol %: 13.5
Sp gr @ 15° C.: 0.806
Sulfur, wt %: 0.01
Smoke pt, mm: 23
Aromatics, vol %: 21

Gas oil
Range, °C.: 235-300
Yield, vol %: 12.9
Sp gr @ 15° C.: 0.840
Sulfur, wt %: 0.05
Cetane index: 52
Cloud pt, °C.: —19

Gas oil
Range, °C.: 300-350
Yield, vol %: 9.2
Sp gr @ 15° C.: 0.860
Sulfur, wt %: 0.25
Cetane index: 57.5
Cloud pt, °C.: +6
Kin. vis., cSt @ 40° C.: 6.36

Residue
Range, °C.: 350+
Yield, vol %: 36.5
Sp gr @ 15° C.: 0.913
Sulfur, wt %: 0.55
Wax, wt %: 13
Pour pt, °C.: +36
Kin. vis., cSt @ 40° C.: 51.8
  @ 100° C.: 13.5
Acid value 0.08
Asphaltenes wt %: 0.05
V/Ni, ppm: 4/1.5

Note: This is assay of unblended Brent crude loaded at offshore SPAR.

Brent Blend, U.K. North Sea

Sullom Voe Terminal, Shetlands

Crude
Gravity, °API: 38.0
Vis., cSt @ 20° C.: 5.67
  @ 37.8° C: 3.64
Pour pt, °C.: —15
Rvp, psig: 12.8
Sulfur, wt %: 0.38
Wax, wt %: 5.2
Asphaltenes, wt %: 0.26
V/Ni/Fe, ppm: 3.8/0.80/0.10

Light naphtha
Range, °C.: C_5—75
Yield, vol %: 6.2
Gravity, °API: 78.3
RON, clear: 72.0
Paraffins, wt %: 79.2
Olefins, wt %: Nil
Naphthenes, wt %: 16.8
Aromatics, wt %: 4.0

Naphtha
Range, °C.: C_5—165
Yield, vol %: 24.5
Gravity, °API: 60.1
Sulfur, ppm: 15
P/O/N/A, wt %: 59.0/Nil/33.0/8.0

Kerosine
Range, °C.: 165-235
Yield, vol %: 12.6
Gravity, °API: 45.0
Sulfur, wt %: 0.043
Smoke pt, mm: 26
Freeze pt, °C.: —56
Aromatics, vol %: 17.9

Gas oil
Range, °C.: 165-350
Yield, vol %: 33.3
Gravity, °API: 39.1
Sulfur, wt %: 0.14
Cetane index: 53.0
Pour pt, °C.: —21
Vis., cSt @ 37.8° C.: 2.37
  @ 50° C.: 1.92
Aniline pt, °C.: 66.8

Gas oil
Range, °C.: 235-350
Yield, vol %: 20.7
Gravity, °API: 35.7
Sulfur, wt %: 0.19
Cetane index: 54.0
Pour pt, °C.: —12
Vis., cSt @ 37.8° C: 3.79
  @ 50° C.: 2.94
Aniline pt, °C.: 71.4

Vaccum gas oil
Range, °C.: 350-550
Yield, vol %: 28.3
Gravity, °API: 26.1
Sulfur, wt %: 0.57
Vis., cSt @ 100° F.: too waxy
Pour pt, °C.: +39
Con. carbon, wt %: 0.29
V/Ni/Fe, ppm: 0.05/0.02/0.14
UOP K factor: 12.3

Residue
Range, °C. 550+
Yield, vol %: 10.3
Gravity, °API: 11.5
Sulfur, wt %: 1.35
Vis., cSt @ 37.8° C.: too waxy
Wax content, wt %: 10.1
Pour pt, °C.: +42
Con. carbon, wt %: 15.7
V/Ni/Fe, ppm: 25/5.7/0.96

Note: Analysis run on sample from tanker at Sullom Voe mid October 1981. Contributors to Brent Blend in early 1983 were North and South Cormorant, Brent, Dunlin, Thistle, and Murchison.

Buchan, U.K. North Sea

CALM in producing area

Crude
Gravity, °API: 33.7
Sulfur, wt %: 0.84
Vis., cSt @ 20° C.: 20.37
Pour pt, °C.: 6
Carbon residue, wt %: 5.0
Total C_1—C_4, yield, wt %: 1.50
V/Ni, ppm wt %: 19/4

Gasoline
Range (TBP), °C.: C_5—95
Yield, vol %: 9.45
Paraffins, wt %: 71.2
Naphthenes, wt %: 24.5
Aromatics, wt %: 4.3

Naphtha
Range, °C: C_5—149
Yield, vol %: 19.9
Sulfur, wt %: 0.0009
P/N/A, wt %: 58.1/31.9/10.0

Kerosine
Range, °C.: 149-232
Yield, vol %: 14.45
Density @ 15° C., kg/l: 0.7965
Sulfur, wt %: 0.037
Aromatics, vol %: 18.8
Smoke pt, mm: 24
Aniline pt, °C.: 54.9
Diesel index: 60
Cetane index: 45

Gas oil
Range, °C.: 232-342
Yield, vol %: 20.55
Density @ 15° C., kg/l: 0.8465
Sulfur, wt %: 0.43
Vis., cSt @ 50° C.: 2.72
Pour pt, °C: —15
Aniline pt, °C: 68.0
Diesel index: 55
Cetane index: 54

Gas oil
Range, °C: 342-369
Yield, vol %: 4.2
Sulfur, wt %: 0.93
Pour pt: °C.: 15
Aniline, pt, °C.: 74.9
Diesel index: 50
Cetane index: 57

Gas oil
Range, °C.: 369-509
Yield, vol %: 20.15
Density @ 15° C., kg/l: 0.9055
Sulfur, wt %: 1.06
Vis., cSt @ 60° C.: 21.1
@ 100° C.: 6.76
Wax, wt %: 12.5
Aniline pt, °C.: 84.6

Residue
Range, °C.: 342+
Yield, vol %: 43.25
Density @ 15° C., kg/l: 0.950
Sulfur, wt %: 1.56
Vis., cSt @ 50° C.: 304
Pour pt, °C.: 36
Carbon residue, wt %: 10.5
V/Ni, wt ppm: 39/8
V/Ni, wt ppm: (509+ °C.): 84/18
Sulfur, wt % (509+ °C.): 2.17

Cormorant, North, U.K. North Sea

Brent system to Sullom Voe

Crude
Gravity, °API: 34.9
Density @ 15° C., kg/l: 0.850
Sulfur, wt %: 0.71
Pour pt, °C.: +12
Kin. vis., @ 40° C., sq mm/sec: 5.76
Acid value, mg KOH/g (TAN): <0.05
C_4—, vol %: 2.6

Gasoline
Range, °C.: C_5—85
Yield, vol %: 7.0
Density @ 15° C.: 0.677
RON, clear: 69
RON + 0.5 g Pb/l: 84

Naphtha
Range, °C.: 85-165
Yield, vol %: 14.5
Density @ 15° C.: 0.759
Paraffins, wt %: 49
Naphthenes, wt %: 39
Aromatics, wt %: 20

Kerosine
Range, °C.: 165-235
Yield, vol %: 11.7
Density @ 15° C: 0.804
Sulfur, wt %: 0.04
Smoke pt, mm: 24
Aromatics, vol %: 20

Gas oil
Range, °C.: 235-300
Yield, vol %: 12.5
Density @ 15° C.: 0.837
Sulfur, wt %: 0.24
Cetane index: 53
Cloud pt, °C.: —23

Gas oil
Range, °C: 300-350
Yield, vol %: 9.4
Density @ 15° C.: 0.860
Sulfur, wt %: 0.56
Cetane index: 58
Cloud pt, °C.: +8
Kin. vis., @ 40° C., sq mm/sec: 5.92

Residue
Range, °C.: 350+
Yield, vol %: 42.7
Density @ 15° C.: 0.916
Sulfur, wt %: 0.56
Wax, wt %: 12
Pour pt, °C.: +36
Kin. vis., @ 60° C., sq mm/sec: 101
@ 100° C.: 20.0
Acid value: 0.05
Asphaltenes, wt %: 0.66
Con. carbon, wt %: 5.4
V/Ni, ppm: 23/11

Note: This was designated a provisional assay in early 1983.

Cormorant, South (Cormorant "A"), U.K. North Sea

Brent system to Sullom Voe

Crude
Gravity, °API: 35.7
Density @ 15° C. (kg/l): 0.846
Sulfur, wt %: 0.56
Pour pt, °C.: —6
Kin. vis., @ 40° C. sq mm/sec: 5.0
Acid value, mg KOH/g (TAN): 0.05
C_4—, vol %: 2.8

Gasoline
Range, °C.: C_5—85
Yield, vol %: 7.5
Density @ 15° C.: 0.679
RON, clear: 71
RON + 0.5 g Pb/l: 85

Naphtha
Range, °C.: 85-165
Yield, vol %: 15.4
Density @ 15° C.: 0.764
Sulfur, wt %: 0.001
Paraffins, wt %: 44
Naphthenes, wt %: 39
Aromatics, wt %: 17

Kerosine
Range, °C.: 165-235
Yield, vol %: 12.9
Density @ 15° C.: 0.806
Sulfur, wt %: 0.03
Smoke pt, mm: 21
Aromatics, vol %: 21

Gas oil
Range, °C.: 235-300
Yield, vol %: 13.4
Density @ 15° C.: 0.840
Sulfur, wt %: 0.16
Cetane index: 51.5
Cloud pt, °C.: —18

Gas oil
Range, °C.: 300-350
Yield, vol %: 7.9
Density @ 15° C.: 0.863
Sulfur, wt %: 0.49
Cetane index: 52
Cloud pt, °C.: +5
Kin. vis., @ 40° C., sq mm/sec: 6.27

Residue
Range, °C.: 350+
Yield, vol %: 40.5
Density @ 15° C.: 0.931
Sulfur, wt %: 1.06
Wax, wt %: 10
Pour pt, °C.: 36
Kin. vis., @ 60° C., sq mm/sec.: 81.1
@ 100° C.: 16.1
Acid value: 0.1
Asphaltenes, wt %: 0.55
V/Ni, ppm: 3/21

Dan, Denmark North Sea

Contributor to Gorm Blend

Crude
Gravity, °API: 30.4
Sulfur, wt %: 0.34
Vis., cSt @ 40° C.: 8.90
Pour pt, °F.: <-45
C_4 & lighter, vol %: 0.8

Light gasoline
Range,° F.: C_5—200
Yield, vol %: 5.8%
Density, kg/l: 0.714
Sulfur, wt %: 0.002
RON, clear: 80.0

Naphtha
Range, °F.: 200-405
Yield, vol %: 20.3
Density, kg/l: 0.791
Sulfur, wt %: 0.05
RON, clear: 63.7

Light gas oil
Range, °F.: 405-650
Yield, vol %: 26.6
Density, kg/l: 0.868
Sulfur, wt %: 0.19
Pour pt, °F.: —45

Heavy gas oil
Range, °F.: 650-1,000
Yield, vol %: 30.0
Density, kg/l: 0.920
Sulfur, wt %: 0.42
Pour pt, °F.: 60
Vis., cSt @ 50° C.: 44.2

Atmospheric resid
Range, °F.: 650+
Yield, vol %: 46.5

Density, kg/l: 0.942
Sulfur, wt %: 0.55
Pour pt, °F.: 45
Vis., cSt @ 50° C.: 269
Carbon residue, wt %: 5.0

Vacuum residue
Range, °F.: 1,000+
Yield, vol %: 16.5
Density, kg/l: 0.977
Sulfur, wt %: 0.70
Pour pt, °F.: 100
Vis., cSt @ 100° C.: 326

Dunlin, U.K. North Sea

Brent system to Sullom Voe

Crude
Gravity, °API @ 60° F.: 34.9
Sulfur, wt %: 0.39
Wax, wt %: 5.0
Pour pt (ASTM max.), °C.: +6
Kin. vis., cSt @ 40° C.: 4.92
C_4—, vol %: 2.3

Gasoline
Range, °C.: C_5—85
Yield, vol %: 6.8
Sp gr @ 15° C.: 0.682
RON, clear: 69

Naphtha
Range, °C.: 85-165
Yield, vol %: 15.2
Sp gr @ 15° C.: 0.761
P/N/A, wt %: 42/43/15

Kerosine
Range, °C.: 165-235
Yield, vol %: 11.8
Sp gr @ 15° C.: 0.809
Sulfur, wt %: 0.025
Smoke pt, mm: 22
Aromatics, vol %: 21

Gas oil
Range, °C.: 235-300
Yield, vol %: 13.0
Sp gr @ 15° C.: 0.846
Sulfur, wt %: 0.13
Cetane index: 50
Cloud pt, °C.: —25

Gas oil
Range, °C.: 300-350
Yield, vol %: 10.0
Sp gr @ 15° C.: 0.864
Sulfur, wt %: 0.32
Cetane index: 56
Cloud pt, °C.: —1
Kin. vis., cSt @ 40° C.: 6.3

Residue
Range, °C.: 350+
Yield, vol %: 41.2
Sp gr @ 15° C.: 0.930
Sulfur, wt %: 0.74
Wax, wt %: 10
Pour pt, °C.: +33
Vis. kin., cSt @ 60° C.: 82.4
@ 100° C.: 18.3
Acid value: 0.2
Asphaltenes, wt %: 0.24
V/Ni, ppm wt %: 5/2

Ekofisk, Norway North Sea

Seal Sands, Teesside, U.K. terminal

Crude
Gravity, °API: 43.4
Sulfur, wt %: 0.14
Pour pt, °F.: 10
Vis., SUS @ 70° F.: 36.1
Rvp, psig: 5.0
Yield, C_1—C_5, wt %: 6.43

Gasoline
Range, °F.: Ibp—176
Yield, vol %: 11.9
RON, clear: 66

Naphtha
Range, °F.: 176-302
Yield, vol %: 20.2
Gravity, °API: 57.9
Paraffins, vol %: 53.1
Naphthenes, vol %: 36.8
Aromatics, vol %: 10.1
Sulfur, ppm: 3

Kerosine
Range, °F.: 302-400
Yield, vol %: 10.6
Gravity, °API: 48.7
Total sulfur, wt %: 0.002
Aniline pt, °F.: 137
Smoke pt, °F.: 23
Freezing pt, °F.: —85

Gas oil
Range, °F.: 400-662
Yield, vol %: 23.4
Gravity, °API: 38.0
Vis., cSt @ 100° F.: 3.01
Pour pt, °F.: 0
Aromatics, vol %: 17
Total sulfur, wt %: 0.07
Aniline pt, °F.: 162
Diesel index: 62

Gas oil
Range, °F.: 302-707
Yield, vol %: 37.3
Gravity, °API: 40.2
Pour pt, °F.: 5

Heavy gas oil
Range, °F.: 707-977
Yield, vol %: 13.2
Gravity, °API: 25.0
Vis., cSt @ 122° F.: 34.05
Pour pt, °F.: 97
Total sulfur, wt %: 0.25
Con. carbon, wt %: 0.047
Aniline, °F.: 200.5
V/Ni/Fe, ppm: 0.8/0.3/0.3

Residue
Range, °F.: 707+
Yield, vol %: 25.2
Gravity, °API: 20.9
Vis., SUS @ 212° F.: 117.2
Pour pt, °F.: 97
Sulfur, wt %: 0.40
Con. carbon, wt %: 4.3
V/Ni/Fe, ppm: 0.4/5.7/1.2

Note: Seven fields contribute to the Ekofisk Blend, which this assay represents. They are Ekofisk, West Ekofisk, Cod (pure gas condensate), Tor, Eldfisk, Edda, and Albuskjell. Condensate is not included in gasoline and naphtha blends listed.

Flotta, U.K. North Sea

Flotta terminal, Orkney Islands

Crude
Gravity, °API: 35.7
Sulfur, wt %: 1.14
Vis., cSt @ 40° F.: 30.8
@ 104° F.: 4.38
Pour pt, °F.: 21.0
C_4 & lighter, vol %: 4.3
Rvp @ 100° F., psi: 9.1

Naphtha
Range, °F.: C_5-149
Yield, vol %: 5.0
Sulfur, wt %: 0.001
Paraffins, vol %: 94.5
Naphthenes, vol %: 3.5
Aromatics, vol %: 1.5
RON, clear: 73.0
RON + 0.4 g Pb/l: 86.0
Rvp @ 100° F., psi: 18.2

Naphtha
Range, °F.: 149-302
Yield, vol %: 14.9
Gravity, °API: 59.9
Sulfur, wt %: 0.001
P/N/A, vol %: 66.0/27.5/16.0
RON, clear: 58.0

Naphtha
Range, °F.: 302-356
Yield, vol %: 5.6
Gravity, °API: 50.0
Sulfur, wt %: 0.04
Rvp @ 100° F., psi: 0.6
P/N/A, vol %: 49.5/30.5/19.5
Smoke pt, mm: 23
Freeze pt, °F.: −76

Kerosine
Range, °F.: 356-455
Yield, vol %: 8.0
Gravity, °API: 44.1
Sulfur, wt %: 0.11
Vis., cSt @ 104° F.: 1.23
Aromatics, vol %: 23.0
Smoke pt, mm: 20.5
Freeze pt, °F.: −48
Aniline pt, °F.: 129
Cloud pt, °F.: −66

Gas oil
Range, °F.: 455-572
Yield, vol %: 11.8
Gravity, °API: 37.0
Sulfur, wt %: 0.51
Vis., cSt @ 104° F.: 2.3
Aromatics, vol %: 28.0
Aniline pt, °F.: 141
Cloud pt, °F.: −10

Gas oil
Range, °F.: 572-650
Yield, vol %: 8.4
Gravity, °API: 32.5
Sulfur, wt %: 1.05
Vis., cSt @ 104° F: 4.78
Aromatics, vol %: 36.0
Aniline pt, °F.: 157
Cloud pt, °F.: 29

Gas oil
Range, °F.: 650-1,000
Yield, vol %: 28.5
Gravity, °API: 23.2
Sulfur, wt %: 1.69
Vis., cSt @ 122° F.: 25.8
Pour pt, °F.: 91
Aniline, pt °F.: 171
Con. carbon residue, wt %: 0.29
V/Ni/Fe, ppm: <1/1/2

Residue
Range, °F.: 650+
Yield, vol %: 42.0
Gravity, °API: 18.3
Sulfur wt %: 2.08
Vis., cSt @ 104° F.: 220
@ 122° F.: 127
Pour pt, °F.: 86
Aniline pt °F.: 173
Con. carbon, wt %: 5.9
V/Ni/Fe: <3/7/3

Note: Flotta is a blend made up of Piper, Claymore, and Tartan crudes. Tartan appears in this section while Piper and Flotta (before introduction of Tartan) are in OGJ, Dec. 3, 1979, p. 102.

Forties, U.K. North Sea

Hound Point terminal, Firth of Forth

Crude
Gravity, °API: 36.6
Sulfur, wt %: 0.30
Vis., cSt @ 10° C.: 9.6
  @ 21.1° C.: 6.81
Pour pt, °C.: −3
Wax, wt %: 7.0
Carbon residue, wt %: 2.2
Asphaltenes, wt %: 0.2
V/Ni, ppm wt: 3/2
Watson K factor: 11.9
C_1-C_4, wt %: 2.74

Gasoline
Range (TBP), °C.: C_5-95
Yield, vol %: 9.23
Sulfur, wt %: <0.001
RON, clear: 69.5
RON + 0.44 ml TEL/l: 83
P/N/A, wt %: 71.1/25.7/3.2

Naphtha
Range, °C.: C_5-149
Yield, vol %: 20.02
Density @ 15° C., kg/l: 0.723
Sulfur, wt %: <0.001
RON, clear: 62
RON + 0.44 ml TEL/l: 77.5
P/N/A, wt %: 54.9/35.8/9.3

Kerosine
Range, °C.: 149-232
Yield, vol %: 14.50
Density @ 15° C., kg/l: 0.7995
Sulfur, wt %: 0.010
Aromatics, vol %: 19.5
Smoke pt, mm: 24
Cold test, °C.: −58
Aniline pt, °C.: 54
Diesel index: 59
Cetane index: 44

Gas oil
Range, °C.: 232-342
Yield, vol %: 20.92
Density @ 15° C., kg/l: 0.852
Sulfur, wt %: 0.14
Vis., cSt @ 37.8° C.: 3.5
  @ 50° C.: 2.7
Cloud pt, °C.: −15
Pour pt, °C.: −15
Aniline pt, °C.: 67
Diesel index: 53
Cetane index: 52

Residue
Range, °C.: 342+
Yield, vol %: 40.96
Density @ 15° C., kg/l: 0.9265
Sulfur, wt %: 0.61
  @ 50° C: 102
Pour pt, °C.: 33
Wax, wt %: 14.3
Carbon residue, wt %: 4.8
Asphaltenes, wt %: 0.5
V/Ni, ppm wt %: 7/4

FCC feed
Range, °C.: 369-509
Yield, vol %: 20.38
Density @ 15° C., kg/l: 0.9045
Sulfur, wt %: 0.44
Vis., cSt @ 37.8° C.: 45.6
Total nitrogen, ppm wt: 960
Aniline pt, °C.: 88

Note: Assay based on analyses of production crude samples obtained at rates of up to 400,000 b/d.

Fulmar, U.K. North Sea

SBM in producing area

Crude
Gravity, °API: 39.3
Density @ 15° C., kg/l: 0.828
Sulfur, wt %: 0.26
Pour pt, °C.: −12
Kin. vis., @ 40° C., sq mm/sec: 2.55
Acid value, mg KOH/g (TAN): 0.06
Yield C_4−, vol %: 2.7

Gasoline
Range, °C.: C_5-85
Yield, vol %: 19.5
Density @ 15° C.: 0.666
RON, clear: 71
RON + 0.5 g Pb/l: 85

Naphtha
Range, °C.: 85-165
Yield, vol %: 19.5
Density @ 15° C.: 0.757
Sulfur, wt %: 0.001
Paraffins, wt %: 55
Naphthenes, wt %: 26
Aromatics: 19

Kerosine
Range, °C.: 165-235
Yield, vol %: 15.7
Density @ 15° C.: 0.804
Sulfur, wt %: 0.02
Smoke pt: 23
Aromatics, vol %: 23

Gas oil
Range, °C.: 235-300
Yield, vol %: 12.2
Density @ 15° C.: 0.839
Sulfur, wt %: 0.06
Cetane index: 51.5

Gas oil
Range, °C.: 300-350
Yield, vol %: 9.5
Density @ 15° C.: 0.856
Sulfur, wt %: 0.26
Cetane index: 60
Cloud pt, °C.: +3
Kin. vis., @ 40° C., sq mm/sec: 5.70

Residue
Range, °C.: 350+
Yield, vol %: 33.1
Density @ 15° C.: 0.916
Sulfur, wt %: 0.56
Pour pt, °C.: +33
Kin. vis., @ 60° C.: sq mm/sec: 44.1
  @ 100° C.: 11.3
Acid value: 0.08
Asphaltenes, wt %: 1.8
V/Ni, ppm: 5/1

Note: This has been designated a tentative assay.

Gorm, Denmark North Sea

SBM in producing area

Crude
Gravity, °API: 33.9
Sulfur, wt %: 0.23
Vis., cSt @ 40° C.: 5.44
Pour pt, °F.: −35
C_4 & lighter, vol %: 1.6

Light gasoline
Range, °F: C_5-300
Yield, vol %: 19.7
Density, kg/l: 0.729
Sulfur, wt %: 0.001
P/N/A vol %: 53/40/7

Naphtha
Range, °F.: 300-400
Yield, vol %: 10.0
Density, kg/l 0.800
Sulfur, wt %: 0.026
Smoke pt, mm: 23
Freezing pt, °F.: <−94
Aniline pt, °F.: 120
P/N/A vol %: 32/47/21

Kerosine
Range, °F.: 400-500
Yield, vol %: 12.1
Density, kg/l: 0.841
Sulfur, wt %: 0.065
Smoke pt, mm: 16
Freezing pt, °F.: −47
Cloud pt, °F.: −50
Pour pt, °F.: −60
Aniline pt, °F.: 134

Diesel oil
Range °F.: 500-650
Yield, vol %: 15.9
Density, kg/l: 0.865
Sulfur, wt %: 0.16
Cloud pt, °F.: 16
Pour pt, °F.: 20
Aniline pt., °F.: 155

Gas oil
Range, °F: 650-815
Yield, vol %: 15.0
Density, kg/l: 0.903
Sulfur, wt %: 0.30
Nitrogen, wt %: 0.08
Pour pt, °F.: 70
Aniline pt., °F.: 176
Vis., cSt @ 50° C.: 19.9

Heavy gas oil
Range, °F.: 815-1,000
Yield, vol %: 10.8
Density, kg/l: 0.924
Sulfur, wt %: 0.37
Nitrogen, wt %: 0.18
Pour pt, °F.: 100
Aniline pt, °F.: 196
Vis cSt @ 50° C.: 110

Residuum
Range, °F: 1,000+
Yield, vol %: 14.9
Density, kg/l: 0.972
Sulfur, wt %: 0.59
Nitrogen, wt %: 0.60
Hydrogen, wt %: 11.2
Carbon residue, wt %: 9.6
Vis., cSt @ 100° C.: 300
V/Ni, ppm: 65/40

Note: Subsequent to this assay Gorm has been joined by crude from Dan field (13% of blend in late 1982) and Skjold field (6% of blend). Skjold is marginal field. Dan has gravity of 30.4° API & sulfur content of 0.34 wt %.

Gullfaks, Norway North Sea

Block 34/10—Not yet in production

Crude
Gravity, °API: 28.6
Sp gr, 60/60: 0.8838
Sulfur, wt %: 0.44
Pour pt, °F.: −50
Vis., cSt @ 100° F.: 10.14

Gasoline
Range, °C.: 20-70
Yield, wt %: 0.8
Sp gr, 60/60: 0.6948
Sulfur, wt ppm: 100
RON, clear: 82.9

Paraffins, wt %: 66
Naphthenes, wt %: 32.1
Aromatics, wt %: 1.9

Gasoline
Range, °C.: 70-100
Yield, wt %: 2.6
Sp gr, 60/60: 0.7433
Sulfur, wt ppm: 500
P/N/A, wt %: 34.8/58.3/6.9

Gasoline
Range, °C.: 100-150
Yield, wt %: 7.0
Sp gr, 60/60: 0.7808
Sulfur, wt %: 0.0023
P/N/A, wt %: 33/44.6/22.4
Yield, wt %: 7.0

Gasoline
Range °C.: 150-190
Yield, wt %: 6.6
Sp gr, 60/60: 0.8056
Sulfur, wt %: 0.0116
P/N/A, wt %: 42.5/32.3/25.2

Kerosine
Range, °C.: 150-205
Yield, wt %: 9.2
Sp gr, 60/60: 0.8108
Sulfur, wt %: 0.0148
Smoke pt, mm: 20
Diesel index: 48
Vis., cSt @ 100° F.: 1.03

Gas oil
Range, °C.: 205-343
Yield, wt %: 28.4
Sp gr, 60/60: 0.8676
Sulfur, wt %: 0.1935
Diesel index: 43
Vis., cSt @ 100° F.: 3.61

Residue
Range, °C.: 343+
Yield, wt %: 51.8
Gravity, °API: 19.3
Sp gr, 60/60: 0.9382
Sulfur, wt %: 0.77
Con. carbon, wt %: 3.8
Vis., cSt @ 100° F.: 351
Pour pt, °F.: 15

Note: This is a preliminary assay.

Magnus, U.K. North Sea

Ninian system to Sullom Voe (hookup slated mid 1983)

Crude
Gravity, °API: 39.3
Sulfur, wt %: 0.28
Pour pt, °C.: −3
Vis., cSt @ 21.1 °C.: 4.56
Carbon residue, wt %: 1.6
V/Ni, ppm wt %: 4/<2
Total C_1-C_4, wt %: 3.15

Gasoline
Range (TBP),°C.: C_5-95
Yield, wt %: 9.8

Naphtha
Range, °C.: 95-175
Yield, wt %: 16.75
P/N/A, wt %: 39.2/41.3/19.5

Naphtha
Range, °C.: C_5-149
Yield, wt %/vol %: 21.45/24.25
Density @ 15° C., kg/l: 0.733
Sulfur, wt %: 0.0015
P/N/A, wt %: 52.9/33.8/13.3

Kerosine
Range, °C.: 149-232
Yield, wt %/vol %: 15.0/15.5
Density @ 15 °C., kg/l: 0.8015
Sulfur, wt %: 0.0085
Acidity, mg KOH/g: 0.03
Aromatics, vol %: 19.9
Cold test, °C.: −53.5
Aniline pt, °C.: 54.2
Cetane index: 44

Gas oil
Range, °C.: 232-342
Yield, wt %/vol %: 21.4/20.9
Density @ 15° C., kg/l: 0.8485
Sulfur, wt %: 0.15
Pour pt, °C.: −15
Acidity, mg KOH/g: 0.05
Aniline pt, °C.: 68.0
Diesel index: 54
Cetane index: 53

Gas oil
Range, °C.: 342-369
Yield, wt %/vol %: 4.4/4.15
Density @ 15° C., kg/l: 0.8755
Sulfur, wt %: 0.39
Vis., cSt @ 50° C.: 6.85
Pour pt, °C.: 12
Aniline pt, °C.: 77.1
Diesel index: 51
Cetane index: 58

Gas oil
Range, °C.: 369-509
Yield, wt %/vol %: 21.15/19.45
Density @ 15° C., kg/l: 0.8995
Sulfur, wt %: 0.43
Vis., cSt @ 98.9° C.: 6.27
Wax, wt %: 17.5
Aniline pt, °C.: 89.1

Residue
Range, °C.: 342+
Yield, wt %/vol %: 39.0/35.15
Density @ 15° C., kg/l: 0.918
Sulfur, wt %: 0.57
Vis., cSt @ 50° C.: 69
Carbon residue, wt %: 4.5
Asphaltenes, wt %: 0.35
V/Ni, ppm wt: 11/4

Residue
Range, °C.: 509+
Yield, wt %/vol %: 13.45/11.55
Density @ 15° C., kg/l: 0.965
Sulfur, wt %: 0.80
Vis., cSt @ 98.9 °C.: 122
Carbon residue, wt %: 12.0
V/Ni, ppm wt %: 30/7

Note: Preliminary guide to Magnus, which was not in production when assay sample obtained.

Maureen, U.K. North Sea

Not yet in production. Production expected late 1983 or early 1984.

Crude
Gravity, °API @ 60° F.: 35.8/35.3*
Sulfur, wt %: 0.55
Pour test, °F.: +45
Vis., SUS @ 70° F.: 78.92/81.79*
C_4−, vol %: 2.6

Gasoline
Range, °F.: 60-200
Yield, vol %: 9.0
Sulfur, wt %: 0.002
RON, clear: 72.5
RON + 3 ml TEL/gal: 91.3

Naphtha
Range, °F.: 60-400
Yield, vol %: 27.9
P/N/A, vol %: 57.32/31.96/10.72
Sulfur, wt %: 0.002
RON, clear: 52.8
RON + 3 ml TEL/gal: 77.8

Kerosine
Range, °F.: 400-500
Yield, vol %: 12.3
Gravity, °API: 39.7
Vis., SUS @ 100° F.: 32.15
Freeze pt, °F: −42
P/N/A, vol %: 37.8/40.1/22.1
Sulfur, wt %: 0.05
Aniline pt, °F.: 141.0
Smoke pt, mm: 20

Gas oil
Range, °F.: 500-650
Yield, vol %: 15.6
Gravity, °API: 34.0
Vis., SUS @ 100° F.: 42.34
Pour pt, °F.: +20
P/N/A, vol %: 34.3/39.8/25.9
Sulfur, wt %: 0.17
Aniline pt, °F.: 163.3
Cetane index: 55.5

Topped crude
Range, °F.: 650+
Yield, vol %: 41.6
Gravity, °API: 19.8
Vis., SUS @ 210° F.: 101.05
Pour pt, °F.: +90
Sulfur, wt %: 0.64
Rams. car. residue, wt %: 5.07
V/Ni, ppm 9.5/4.5

Note: The inspection of fractions is based on composite of three drillstem test samples.
* Results from two samples.

Montrose, U.K. North Sea

SBM in producing area

Crude
Gravity, °API: 40.1
Sulfur, wt %: 0.23
Rvp, psi: 4.0
Pour pt, °F.: 15
Neut. no., mg KOH/g: 0.28
Rams. carbon, wt %: 1.3
Vis kin., cSt @ 68° F.: 4.96
  @ 100° F.: 3.27
V/Ni, ppm: 2/2
C_4−, vol %: 2.2

Gasoline
Range (TBP), °F.: C_5-200
Yield, vol %: 12.3
Sulfur, wt %: 0.002
P/N/A, vol %: 70.0/27.1/2.9
RON, clear: 71.4
RON + 3 cc TEL/gal: 89.5

Naphtha
Range, °F.: 200-320
Yield, vol %: 15.0
Gravity, °API: 55.5
Sulfur, wt %: 0.001
Charac. factor: 11.84
P/N/A vol %: 56.2/33.5/10.3
RON, clear: 42.8
RON + 3 cc TEL/gal: 68.0

Kerosine
Range, °F.: 320-400
Yield, vol %: 8.9
Gravity, °API: 47.7
Sulfur, wt %: 0.005
Aniline pt, °F.: 137.7
Diesel index: 65.7

Cetane index: 45.1
Freeze pt, °F.: −75
Smoke pt, mm: 24

Gas oil
Range, °F.: 400-650
Yield, vol %: 25.4
Gravity, °API: 38.2
Sulfur, wt %: 0.082
Aniline pt, °F.: 161.1
Diesel index: 61.6
Cetane index: 55.1
Cloud pt, °F.: 10
Pour pt, °F.: 4
Vis., SUS @ 100° F.: 35.2
Total nitrogen, wt %: 0.009

Residue
Range, °F.: 650+
Yield, vol %: 36.6
Gravity, °API: 23.7
Sulfur, wt %: 0.5
Pour pt, °F.: 80
Total nitrogen, wt %: 0.136
Rams. carbon, wt %: 3.3
Vis., SUS @ 122° F.: 334.6
@ 210° F.: 67.1
V/Ni, ppm: 4/4

Murchison, U.K. & Norway, North Sea

Brent system to Sullom Voe terminal

Crude
Gravity, °API: 38.0
Kin. vis., @ 100° F.: 3.60
Con. carbon residue, wt %: 1.1
Sulfur, wt %: 0.27
V/Ni, ppm: 2.5/0.7
Pour pt, °C.: +7.2
Rvp, psi: 9.0
C_4 & lighter, vol %: 3.0

Naphtha
Range (TBP), °F.: 86-375
Yield, vol %: 31.2
Paraffins, vol %: 55.5
Naphthenes, vol %: 32.8
Sulfur, wt %: <0.01

Kerosine
Range, °F.: 375-520
Yield, vol %: 13.5
Gravity, °API: 42.2
Sulfur, wt %: 0.02
Aromatics, vol %: 17

Heavy distillate
Range, °F.: 520-700
Yield, vol %: 21.4
Gravity, °API: 34.1
Sulfur, wt %: 0.16

Gas oil
Range, °F.: 700-1,020
Yield, vol %: 21.0
Gravity, °API: 25.8
Sulfur, wt %: 0.43

Residue
Range, °F.: 1,020+
Yield, vol %: 11.9
Gravity, °API: 13.7
Sulfur, wt %: 0.93
Kin. vis. @ 210° F.: 196
Con. carbon residue, wt %: 11.8
V/Ni, ppm: 18/5

Ninian Blend, U.K. North Sea

Ninian system to Sullom Voe terminal

Crude
Gravity °API: 35.6
Sulfur, wt %: 0.43
Vis., cSt @ 40° C.: 5.61
Pour pt, °F.: 35
C_4 & lighter, vol %: 2.6

Light gasoline
Range, °F.: C_5-300
Yield, vol %: 19.9
Density, kg/l: 0.726
Sulfur, wt %: 0.001
Paraffins, vol %: 63
Naphthenes, vol %: 27
Aromatics, vol %: 10

Naphtha
Range, °F.: 300-400
Yield, vol %: 9.3
Density kg/l: 0.788
Sulfur, wt %: 0.006
Smoke pt, mm: 27
Aniline pt, °F.: 128
P/N/A, vol %: 44/40/16

Kerosine
Range, °F.: 400-500
Yield, vol %: 11.1
Density, kg/l: 0.828
Sulfur, wt %: 0.047
Smoke pt, mm: 21
Freeze pt, °F.: −33
Cloud pt, °F.: −40
Pour pt, °F.: −40
Aniline pt, °F.: 143

Diesel oil
Range, °F.: 500-650
Yield, vol %: 14
Density, kg/l: 0.852
Sulfur, wt %: 0.23
Cloud pt, °F.: 20
Pour pt, °F.: 20
Aniline pt, °F.: 164

Gas oil
Range, °F.: 650-815
Yield, vol %: 13.1
Density, kg/l: 0.883
Sulfur, wt %: 0.46
Nitrogen, wt %: 0.05
Pour pt, °F.: 75
Aniline pt, °F: 184
Vis., cSt @ 50° C.: 10.7

Heavy gas oil
Range, °F.: 815-1,000
Yield, vol %: 14.0
Density, kg/l: 0.906
Sulfur, wt %: 0.60
Nitrogen, wt %: 0.10
Pour pt, °F: 110
Aniline pt, °F: 205
Vis., cSt @ 50° C.: 71.3

Residue
Range, °F.: 1,000+
Yield, vol %: 16.0
Density, kg/l: 0.982
Sulfur, wt %: 1.2
Nitrogen, wt %: 0.40
Carbon residue, wt %: 11.7
Vis., cSt @ 100° C.: 291
V/Ni, ppm: 24/4

Note: This assay prepared when Heather field made up of 10% Ninian Blend. Magnus field is scheduled to contribute to Ninian system in mid 1983

Statfjord, Norway & UK, North Sea

"A" and "B" SPM buoys in producing area

Crude
Gravity, °API: 38.4
Pour pt, °F.: 40
Kin. vis., @ 59° F.: 7.33
Con. carbon residue, wt %: 1.32
Sulfur, wt %: 0.27
Rvp, psi: 5.5
Total nitrogen, ppm: 1.03
V/Ni, ppm: 0.53/1.03
C_5 & lighter, vol %: 5.08

Naphtha
Range (TBP), °F.: 60-100
Yield, vol %: 6.49
Sp gr, 60° F./60° F.: 0.6740
Rvp, psi: 10.3
Paraffins, vol %: 80.1
Naphthenes, vol %: 17.8
Aromatics, vol %: 2.1

Naphtha
Range, °F.: 100-360
Yield, vol %: 22.12
Sp gr 0.7603
P/N/A: 48.9/37.3/13.8
RON, clear: 51.3
RON +3 ml TEL: 74.2
Sulfur, wt %: 0.0037

Kerosine
Range, °F.: 360-503
Yield, vol %: 15.08
P/N/A, vol %: 48.1/34.6/17.2
Freeze pt, °F.: −47
Cloud pt, °F.: −52
Smoke pt, mm: 20
Aniline pt, °F: 142.1
Diesel index: 60
Cetane index: 49
Sulfur, wt %: 0.03

Light gas oil
Range, °F.: 503-710
Yield, vol %: 22.22
Sp gr, 60° F./60° F.: 0.8526
Gravity, °API: 34.5
Pour pt, °F.: 25
Aniline pt, °F.: 166

Heavy gas oil
Range, °F.: 710-946
Yield, vol %: 22.09
Gravity, °API: 25.6
Pour pt, °F.: 105
Kin. vis., cSt @ 100° F.: 66.27
Aniline pt, °F.: 200
Sulfur, wt %: 0.40
Basic nitrogen, ppm: 375
Con. carbon residue, wt %: 0.07

Residue
Range, °F.: 946+
Yield, vol %: 9.84
Gravity, °API: 14.2
Pour pt, °F.: 120
Kin. vis., cSt @ 100° F.: 24,732.61
Sulfur, wt %: 0.74
Total nitrogen, ppm: 1,750
Con. carbon, wt %: 10.58
V/Ni, ppm: 8.1/5.7

Note: This assay is on production from Statfjord "A" platform. Statfjord "B" began operation in November 1982.

Tartan, U.K. North Sea

Flotta system

Crude
Gravity, °API: 41.7
Sulfur, wt %: 0.56
Vis., cSt @ 40° F.: 11.6
Pour pt, °F.: 16
C_4 & lighter, vol %: 3.5
Rvp @ 100° F., psi: 10.2

Naphtha
Range, °F.: C_5-149
Yield, vol %: 5.7
Sulfur, wt %: 0.001
Paraffins, vol %: 97.0
Naphthenes, vol %: 1.5
Aromatics, vol %: 1.0
RON, clear: 70.2

Naphtha
Range, °F.: 149-302
Yield, vol %: 20.0
Gravity, °API: 58.5
Sulfur, wt %: 0.01
P/N/A, vol %: 56.5/25.5/17.5
RON, clear: 56.6

Naphtha
Range, °F.: 302-356
Yield, vol %: 7.1
Gravity, °API: 49.4
Sulfur, wt %: 0.06
P/N/A, vol %: 50/30/19.5

Kerosine
Range, °F.: 356-455
Yield, vol %: 10.8
Gravity, °API: 44.0
Sulfur, wt %: 0.1
Aromatics, vol %: 23.5
Smoke pt, mm: 20
Freeze pt, °F.: −52
Aniline pt, °F.: 135

Gas oil
Range, °F.: 455-572
Yield, vol %: 12.3
Gravity, °API: 37.3
Sulfur, wt %: 0.32
Aromatics, vol %: 28.0
Aniline pt, °F.: 149

Gas oil
Range, °F.: 572-650
Yield, vol %: 8.3
Gravity, °API: 34.0
Sulfur, wt %: 0.64
Aromatics, vol %: 32.0
Aniline pt, °F.: 167

Residue
Range, °F.: 650+
Yield, vol %: 32.3
Gravity, °API: 23.1
Sulfur, wt %: 1.22
Vis., cSt @ 122° F.: 55.5
Con. carbon residue, wt %: 2.5
V/Ni/Fe, ppm: 6.0/2.0/4.0

Note: Tartan is part of Flotta Blend.

Thistle, U.K. North Sea

Brent system to Sullom Voe terminal

Crude
Gravity, °API: 37.03
Vis., cSt @ 20° C.: 5.87
@ 37.8° C.: 4.26
Pour pt, °C.: 12
Rvp, psig: 7.5
H_2S, wt %: <0.01
Acid no., mg KOH/g: <0.05
Sulfur, wt %: 0.31
Wax, wt %: 7.7
Asphaltenes, wt %: 0.19
C_4—, wt % on crude (GLC): 0.69

Gasoline
Range, °C.: C_5-85
Yield, vol %/wt %: 7.0/5.6
Density @ 15° C., g/cc: 0.6771
Sulfur, wt %: <0.01
RON, clear/0.5 g TEL per liter: 71.6/84.7
PO/N/A, wt %: 64.0/Nil/25/11.0

Naphtha
Range, °C.: 85-165
Yield, vol %/wt %: 16.6/15.0
Density @ 15° C., g/cc: 0.7547
Sulfur, wt %: <0.01
P/O/N/A, wt %: 44.5/Nil/42.9/12.6

Kerosine
Range, °C.: 165-235
Yield, vol %/wt %: 12.6/11.9
Density @ 15° C., g/cc: 0.7984
Sulfur, wt %: 0.02
Smoke pt, mm: 24
Freeze pt, °C.: −51
Aniline pt, °C.: 58.7
Aromatics, vol %: 15.0

Light gas oil
Range, °C.: 235-300
Yield, vol %/wt %: 12.9/12.9
Density @ 15° C., g/cc: 0.8393
Sulfur, wt %: 0.06
Vis., cSt @ 37.8° C.: 2.46
Cetane index: 49.5
Pour pt, °C.: −24
Cloud pt, °C.: −22
Aniline pt, °C.: 65.9
Con. car. residue (on 10% residue), wt %: 0.004

Heavy gas oil
Range, °C.: 300-350
Yield, vol %/wt %: 9.6/9.8
Density @ 15° C., g/cc: 0.8494
Sulfur, wt %: 0.21
Vis., cSt @ 37.8° C.: 5.47
Cetane index: 58.5
Pour pt, °C.: 0
Cloud pt, °C.: 1
Aniline pt, °C.: 77.9
Con. car. residue (on 10% residue), wt %: 0.039

Residue
Range, °C.: 350+
Yield, vol %/wt %: 39.8/43.8
Density @ 15° C., g/cc: 0.9217
Sulfur, wt %: 0.63
Vis., cSt @ 98.9° C.: 14.77
Pour pt, °C.: 39
Asphaltenes, wt %: 0.95
Con. car. residue, wt %: 4.6
V/Ni, ppm: 7.5/1.9
-30

West African

Bonny Light, Nigeria

Bonny shore terminal and Bonny marine SBM (12 miles offshore in Atlantic)

Crude
Gravity, °API: 36.7
Sulfur, wt %: 0.12
Salt, lb/1,000 bbl: 12
Wax, wt %: 7.5
Carbon residue, wt %: 1.0
V/Ni, ppm wt: <2/3
Vis., cSt @ 37.8° C.: 3.47
Yield C_1—C_4, wt %: 2.10

Naphtha
Range (TBP), °C.: C_5—149
Yield, vol %: 20.85
Sulfur, wt %: 0.002
Watson K factor: 12.2
RON, clear: 68.5
RON + 0.44 ml TEL/l: 81.5
Paraffins, wt %: 42.6
Naphthenes, wt %: 47.6
Aromatics, wt %: 9.8

Kerosine
Range, °C.: 149—232
Yield, vol %: 16.8
Sulfur, wt %: 0.020
Aromatics, vol %: 17
Smoke pt, mm: 21
Freeze pt, °C.: −61
Aniline pt, °C.: 53
Diesel index: 54
Cetane index: 39

Gas oil
Range, °C.: 232—342
Yield, vol %: 27.1
Sulfur, wt %: 0.10
Cloud pt, °C.: −11
Pour pt, °C.: −12
Wax, wt %: 5.5
Aniline pt, °C.: 67
Diesel index: 51
Cetane index: 49

Heavy gas oil
Range, °C.: 369—509
Yield, vol %: 19.6
Sulfur, wt %: 0.22
Vis., cSt @ 37.8° C.: 56.4
Pour pt, °C.: 39
Wax, wt %: 26
Total nitrogen, ppm wt: 1,180
Watson K factor: 11.9
Aniline pt, °C.: 86

Residue
Range, °C.: 342+
Yield, vol %: 32.6
Sulfur, wt %: 0.25
Vis., cSt @ 3.78° C.: 115
Pour pt, °C.: 39
Wax, wt %: 22
Total nitrogen, wt %: 0.24
Carbon residue, wt %: 2.7
V/Ni, ppm wt: 1/9
Watson K factor: 11.85

Note: Numerous fields contribute to Bonny Light and Medium blends, whose qualities are also influenced by national output. Analysis is on sample taken during period of high production.

Bonny Medium, Nigeria

Bonny shore terminal and Bonny marine CALM (12 miles offshore in Atlantic)

Crude
Gravity, °API: 25.2
Sulfur, wt %: 0.23
Vis., cSt @ 37.8 °C.: 12.1
Pour pt, °C.: −27
Carbon residue, wt %: 1.7
V/Ni, ppm wt: <1/7
C_1—C_4 yield, wt %: 0.52

Naphtha
Range (TBP), °C.: C_5—149
Yield, vol %: 6.31
Sulfur, wt %: 0.003
RON, clear: 73.5
RON + 0.44 ml TEL/l: 85.5
Paraffins, wt %: 32.8
Naphthenes, wt %: 54.7
Aromatics, wt %: 12.5

Kerosine
Range, °C.: 149—232
Yield, vol %: 12.85
Sulfur, wt %: 0.038
Aromatics, vol %: 16.5
Smoke pt, mm: 19
Freeze pt, °C.: <−70
Aniline pt, °C.: 49
Diesel index: 44
Cetane index: 32

Gas oil
Range, °C.: 232—343
Yield, vol %: 34.3
Density @ 15° C., kg/l: 0.889
Sulfur, wt %: 0.16
Vis., cSt @ 37.8 °C.: 4.7
Cloud pt, °C.: −32
Pour pt, °C.: −33
Aniline pt, °C.: 55
Diesel index: 36
Cetane index: 38

Heavy gas oil
Range, °C.: 369—509
Yield, vol %: 25.6
Density @ 15° C., kg/l: 0.9405
Sulfur, wt %: 0.31
Vis., cSt @ 37.8° C.: 162
Pour pt, °C.: 24
Total nitrogen, ppm wt: 1,790
Aniline pt, °C.: 72

Residue
Range, °C.: 342+
Yield, vol %: 45.95
Density @ 15° C., kg/l: 0.953
Sulfur, wt %: 0.37
Vis. @ 37.8 °C.: 515
Pour pt, °C.: 24
Carbon residue, wt %: 3.5
V/Ni, ppm wt: 2/15

Note: See note at end of Bonny Light assay.

Brass River, Nigeria

CALM some 12 miles off mouth of Brass

Crude
Gravity, °API @ 60° F.: 40.9
Sulfur, wt %: 0.09
Pour test, °F.: +35
Vis., SUS @ 70° F.: 38.66
Rvp, psi @ 100° F.: 6.9
Salt, lb/1,000 bbl: 3.8
V/Ni, ppm: 2.0/1.7
C_4 & lighter yield, vol %: 1.9

Gasoline
Range, °F.: 60—200
Yield, vol %: 11.2
Total sulfur, wt %: 0.001
RON, clear: 74.6
RON + 3 ml TEL/gal: 92.2
Rvp, psi: 12.4

Naphtha
Range, °F.: 200—300
Yield, vol %: 16.6
Paraffins, vol %: 44.97
Naphthenes, vol %: 43.52
Aromatics, vol %: 11.51
Total sulfur, wt %: <0.001

Naphtha
Range, °F.: 300—400
Yield, vol %: 11.5
P/N/A, vol %: 45.78/38.45/15.77
Total sulfur, wt %: 0.0087
Aniline pt, °F.: 128.0
Smoke pt, mm: 26

Kerosine
Range, °F.: 400-500
Yield, vol %: 16.9
Freezing pt, °F.: −36
P/N/A, vol %: 45.9/37.2/16.9
Total sulfur, wt %: <0.05
Aniline pt, °F.: 146.2
Smoke pt, mm: 20

Gas oil
Range, °F.: 500—650
Yield, vol %: 15.7
Gravity, °API: 33.9
Vis., SUS @ 100° F.: 41.41
Pour pt, °F.: +30
P/N/A, vol %: 47.0/32.1/20.9
Total sulfur, wt %: 0.06
Aniline pt, °F 167.2
Cetane index (determined): 57.4

Residue
Range, °F.: 650+
Yield, vol %: 26.5
Vis., SUS @ 210° F.: 53.55
Pour pt, °F.: +105
Total sulfur, wt %: 0.14
Rams. carbon residue, wt %: 2.31
V/Ni/Fe, ppm: 6.6/5.7/5.8

Heavy gas oil
Range (vac. flash), °F.: 625—1,100
Yield, vol %: 24.7
Aniline pt, F.: 190.1
Vis., SUS @ 130° F.: 127.55
Pour pt, °F.: +105
Sulfur, wt %: 0.33
Rams. carbon res., wt %: 0.67
V/Ni/Fe, ppm: 0.2/1.2/<0.2
Nitrogen, wt %: 0.139

Cabinda, Angola

CALM in producing area off Malongo terminal, Cabinda

Crude
Gravity, °API: 31.7
Sulfur, wt %: 0.17
Vis., SUS @ 100° F.: 93.5
Pour pt, °F.: +65
C_4 & lighter, vol %: 1.58
Rvp, psi: 3.8
V/Ni, ppm: 2.4/15.9
Salt, lb/1,000 bbl: 18
ASTM, 50% pt, °F.: >590

Light naphtha
Range (TBP), °F.: Ibp—140*
Yield, vol %: 2.18
Sulfur, wt %: 0.024
RON, clear: 77.3

Light naphtha
Range, °F.: 140—170
Yield, vol %: 1.67
Sulfur, wt %: 0.018
Paraffins, vol %: 77.6
Naphthenes, vol %: 21.4
Aromatics, vol %: 1.0
RON, clear: 65.1

Heavy naphtha
Range, °F.: 170—310
Yield, vol %: 9.98
Sulfur, wt %: 0.06
P/N/A, vol %: 50.0/44.8/5.2
Aniline pt, °F.: 134.4

Kerosine
Range, °F.: 310—520
Yield, vol %: 16.27
Gravity, °API: 43.7
Sulfur, wt %: 0.08
Freezing pt, °F.: −42
Aniline pt, °F.: 148.5
Cetane index: 50.8
Smoke pt, mm: 25

Light gas oil
Range, °F.: 520—680
Yield, vol %: 15.83
Gravity, °API: 34.9
Vis., SUS @ 100° F.: 44.4
Sulfur, wt %: 0.14
Pour pt, °F.: +35
Diesel index: 61.2
Cetane index: 60.5

Heavy gas oil
Range (TBP to EFV), °F.: 680—1,000
Yield, vol %: 29.34
Gravity, °API: 25.8
Vis., SUS @ 210° F.: 55.6
Sulfur, wt %: 0.16
Total nitrogen, ppm: 1,400
Pour pt, °F.: +115
Aniline pt, °F.: 210.2
V/Ni, ppm: >0.1/0.4

Residual oil
Range, °F.: 680+
Yield, vol %: 52.87
Gravity, °API: 20.4
Vis., SUS @ 210° F.: 210
Sulfur, wt %: 0.24
Con. carbon res., wt %: 5.82
Pour pt, °F.: +95
V/Ni, ppm: 4.2/28

*Does not include C_4 and lighter

Djeno Blend, Congo (Brazzaville)

CALM located 3.8 km from Djeno tank farm

Crude
Gravity, °API: 26.87
Vis., cSt @ 10° C.: 220
Pour pt, °C.: +3
Rvp @ 37.8° C., g/sq cm: 290
Total sulfur, wt %: 0.33
Acidity, mg KOH/g: 1.10
UOP charac. factor: 12.0
V/Ni, kg/mg: <1/23
Yield C_1—C_5, vol %: 2.37

Gasoline
Range, °C.: 15—80
Yield, vol %: 2.59
RON, clear: 69.0
Sulfur, wt %: 0.0876
Aromatics, vol %: 1.3

Naphtha
Range, °C.: 80—180
Yield, vol %: 11.86
Paraffins, vol %: 52.5
Naphthenes, vol %: 39.8
Aromatics, vol %: 7.7
Sulfur, wt %: 0.16

Kerosine
Range, °C.: 180—225.
Yield, vol %: 5.90
Freezing pt, °C.: −51
Smoke pt, mm: 20
Sulfur, wt %: 0.20
Aromatics, vol %: 12.5

Gas oil
Range, °C.: 225—350
Yield, vol %: 21.88
Pour pt, °C.: −10
Cloud pt, °C.: −7
Sulfur, wt %: 0.17

Heavy gas oil
Range, °C.: 400—550
Yield, vol %: 21.88
Density 15/4 °C.: 0.926
Pour pt, °C.: +39
Vis., cSt @ 50° C.: 185
V/Ni, ppm: <0.5/<1
Sulfur, wt %: 0.25
Nitrogen, pm: 944
Aniline pt. °C.: 95.7
Con. carbon residue, wt %: 0.60

Residue
Range, °C.: 350+
Yield, vol %: 57.42
Density, 15/4 °C.: 0.952
Pour pt, °C.: +30
Vis., cSt @ 50° C.: 1,850
Sulfur, wt %: 0.41

Escravos, Nigeria

CALM in offshore producing area

Crude
Gravity, °API: 36.2
Sulfur, wt %: 0.14
Vis., SUS @ 100° F.: 37.6
Pour pt, °F.: +10
C_4 & lighter, vol %: 2.24
Rvp, lb: 4.3
V/Ni, ppm: 0.3/3.8
Salt, lb/1,000 bbl: 1
Uncondensed gases, vol %: 1.95

Light naphtha
Range (TBP), °F.: lbp—140
Yield, vol %: 2.82
Gravity, °API: 88.0
Sulfur, wt %: 0.015
RON, clear: 82.6

Light naphtha
Range (TBP), °F.: 140—170
Yield, vol %: 1.60
Gravity, °API: 74.5
Sulfur, wt %: 0.009
P/N/A, vol %: 72.0/24.6/3.4
RON, clear: 75.0

Heavy naphtha
Range (TBP), °F.: 170—310
Yield, vol %: 16.13
Gravity, °API: 55.6
Sulfur, wt %: 0.013
P/N/A, vol %: 41.6/46.5/11.9
Aniline pt, °F.: 113.9

Kerosine
Range (TBP), °F.: 310—520
Yield, vol %: 28.55
Gravity, °API: 39.5
Sulfur, wt %: 0.06
Freezing pt, °F.: −51
Aniline pt, °F.: 131.4
Cetane index: 38.5
Smoke pt (ASTM), mm: 15

Light gas oil
Range (TBP), °F.: 520—680
Yield, vol %: 19.17
Gravity, °API: 31.1
Vis., SUS @ 100° F.: 44.9
Sulfur, wt %: 0.19
Pour pt, °F.: +30
Diesel index: 49.9
Cetane index: 47.0

Heavy gas oil
Range (TBP or EFV), °F.: 680—1,000
Yield, vol %: 23.76
Gravity, °API: 22.4
Vis., SUS @ 210° F.: 56.1
Sulfur, wt %: 0.22
Nitrogen (total), ppm: 1,700
Pour pt, °F.: +120
Aniline pt, °F.: 190.0
V/Ni, ppm: >0.1/0.9

Residual oil
Range (TBP or EFV), °F.: 680+
Yield, vol %: 29.78
Gravity, °API: 19.9
Vis., SUS @ 210° F.: 93.5
Sulfur, wt %: 0.27
Con. carbon residue, wt %: 3.72
Pour pt, °F.: +115
V/Ni, ppm: 1.0/11.5

Espoir, Ivory Coast

CALM yoke with permanent floating storage in producing area

Crude
Gravity, °API: 31.4
Sp gr @ 60° F.: 0.8686
Sulfur, wt %: 0.32
Pour test, °F.: +5
Vis., SUS @ 70° F.: 69.78
Rvp @ 100° F., psi: 5.5
Salt lb/1,000 bbl: 15.0
Yield, NC_4 & lighter, vol %: 0.8
V/Ni, ppm: 1.7/5.8

Gasoline
Range, °F.: 60—200
Yield, vol %: 4.5
Total sulfur, wt %: <0.001
RON, clear (calc.): 73.6

Naphtha
Range, °F.: 200—300
Yield, vol %: 10.9
Total sulfur, wt %: 0.0049
Aniline pt, °F.: 118.5

Naphtha
Range, °F.: 300—400
Yield, vol %: 9.4
Paraffins, vol %: 43.42
Naphthenes, vol %: 48.19
Aromatics, vol %: 8.39
Total sulfur, wt %: 0.036
Aniline pt, °F.: 121.5
Smoke pt, mm: 25

Kerosine
Range, °F.: 400—500
Gravity, °API: 36.1
Vis., SUS @ 100° F.: 32.84
Freezing pt, °F.: −56
P/N/A, vol %: 26.3/50.9/22.8
Sulfur, wt %: 0.07
Aniline pt, °F.: 136.1
Smoke pt, mm: 19

Light gas oil
Range, °F.: 500—650
Yield, vol %: 17.1
Gravity, °API: 30.7
Vis., SUS @ 100° F.: 45.28
Pour pt, °F.: +10
P/N/A, vol %: 28.3/49.8/21.9
Total sulfur, wt %: 0.22
Aniline pt, °F.: 157.4

Vacuum gas oil
Range, °F.: 620—1,000
Yield, vol %: 25.7
Gravity, °API: 23.3
Aniline pt, °F.: 192.1
Vis., SUS @ 130° F.: 152.01
Pour pt, °F.: +90
Sulfur, wt %: 0.39
Rams. carbon res., wt %: 0.15
V/Ni, ppm: 0.1/0.2
Nitrogen, wt %: 0.086

Residue
Range, °F.: 650+
Yield, vol %: 42.9
Vis., SUS @ 210° F.: 125.43
Pour pt, °F.: +80
Total sulfur, wt %: 0.565
Rams. carbon res., wt %: 3.69
Nitrogen, wt %: 0.225
V/Ni, ppm: 3.8/12.6

Forcados Blend, Nigeria

CALMS some 7 miles off coast

Crude
Gravity, °API: 29.7
Sulfur, wt %: 0.29
Pour pt, °C.: −20
Kin. vis., cSt @ 10° C.: 10.6
C_4 & lighter: 0.7

Light naphtha
Range, °C.: C_5—65
Yield, wt %: 1.4
Density @ 15° C., g/cu cm: 0.650
RON + 0.4 g Pb/l: 87.5

Heavy naphtha
Range, °C.: 65—175
Yield, wt %: 12.3
Density @ 15° C., g/cu cm: 0.765
RON + 0.4 g Pb/l: 75
Aromatics, vol %: 12.0
Naphthenes, vol %: 53

Kerosine
Range, °C.: 175—225
Yield, wt %: 9.0
Density @ 15° C., g/cu cm: 0.830
Sulfur, wt %: 0.04

Gas oil
Range, °C.: 225—360
Yield, wt %: 37.8
Density @ 15° C., g/cu cm: 0.880
Sulfur, wt %: 0.18
Pour pt, °C.: −17
Cold filter pour pt, °C.: −15
Kin. vis., cSt @ 100° C.: 1.46

Heavy gas oil
Range, °C.: 360—525
Yield, wt %: 28.6
Density @ 15° C.: 0.941
Sulfur, wt %: 0.40
Kin. vis., cSt @ 100° C.: 10.6

Residue
Range, °C.: 360+
Yield, wt %: 38.8
Density @ 15° C.: 0.953
Sulfur, wt %: 0.56
Kin. vis., cSt @ 100° C.: 22.1

Gamba, Gabon

Buoy 6 km offshore from Gamba tank farm

Crude
Gravity, °API: 31.8
Vis., cSt @ 37.8° C.: 36.7
Pour pt, °C.: +23
Total sulfur, wt %: 0.11
Con. carbon, wt %: 3.10
UOP charac. factor: 12.20
Yield C_1—C_5, vol %: 1.42

Gasoline
Range, °C.: C_5—80
Yield, vol %: 1.3
Rvp, psi, g/sq cm: 800
RON, clear: 90
Sulfur, wt %: 0.0036

Heavy naphtha
Range, °C.: 80—160
Yield, vol %: 4.9
Density @ 15/4 °C.: 0.753
Paraffins, vol %: 46.9
Naphthenes, vol %: 50.6
Aromatics, vol %: 2.5
Sulfur, wt %: 0.0069

Kerosine
Range, °C.: 160—250
Yield, vol %: 11.8
Density @ 15/4 °C.: 0.808
Freezing pt, °C.: −52
Smoke pt, mm: 23
Sulfur, wt %: 0.014
Aniline pt, °C.: 64.2
Aromatics, vol %: 14.0

Gas oil
Range, °C.: 250—350
Yield, vol %: 19.3
Density @ 15/4 °C.: 0.838
Pour pt, °C.: −14
Cloud pt, °C.: −11
Vis., °Engler @ 20° C.: 1.58
Cetane index: 53
Sulfur, wt %: 0.057
Diesel index: 66
Aniline pt, °C.: 80.4

Residue
Range, °C.: +350
Yield, vol %: 62.0
Density @ 15/4 °C.: 0.900
Pour pt., °C.: +45
Vis., °Engler @ 50° C.: 18.9
Sulfur, wt %: 0.16

Kole Marine Blend, Cameroon

CALM with floating storage in offshore producing area

Crude
Gravity, °API: 34.89
Vis., cSt @ 10° C.: 11.1
Pour pt, °C.: −6
Total sulfur, wt %: 0.30
Rvp @ 37.8° C., g/sq cm: 445
Paraffins, wt %: 6.2
Con. carbon, wt %: 3.65
UOP charac. factor: 11.9
V/Ni, kg/mg: 9/27
C_1—C_5, yield, vol %: 6.12

Light gasoline
Range, °C.: 15—80
Yield, vol %: 5.71
RON, clear: 76.2

Heavy naphtha
Range, °C.: 80—180
Yield, vol %: 21.89
Density, 15/4 °C.: 0.765
Paraffins, vol %: 38.5
Naphthenes, vol %: 53.3
Aromatics, vol %: 8.2
Sulfur, wt %: 0.0080

Kerosine
Range, °C.: 180—225
Yield, vol %: 8.21
Density @ 15/4 °C.: 0.819
Freeze pt, °C.: −63
Smoke pt, mm: 20
Sulfur, wt %: 0.0467
Aromatics, vol %: 13.4

Gas oil
Range, °C.: 150—400
Yield, vol %: 43.89
Density @ 15/4 °C.: 0.839
Pour pt, °C.: −9
Vis., cSt @ 50° C.: 2.6
Cetane index: 52.0
Sulfur, wt %: 0.16

Gas oil
Range, °C.: 180—350
Yield, vol %: 30.46
Density @ 15/4 °C.: 0.838
Pour pt, °C.: −22
Sulfur, wt %: 0.15

Residue
Range, °C.: 350+
Yield, vol %: 38.91
Density @ 15/4 °C.: 0.947
V/Ni, ppm: 20/68
Pour pt, °C.: +33
Vis. @ 50° C.: 425
Ash, wt %: 0.05
Sulfur, wt %: 0.54

Lucina Marine, Gabon

CALM with floating storage in offshore producing area

Crude
Gravity, °API: 39.52
Vis., cSt @ 20° C.: 16.00
Pour pt, °C.: +15
Rvp @ 37.8° C., g/sq cm: 450
Total sulfur, wt %: 0.05
Asphaltenes, wt %: 0.06
UOP charac. factor: 12.25
V/Ni, kg/mg: 1.3/12.2

Gasoline
Range, °C.: C_5—80
Yield, vol %: 5.56
Rvp, g/sq cm: 698
RON, clear: 66.3

Heavy gasoline
Range, °C.: 80—150
Yield, vol %: 13.46
Paraffins, vol %: 54.3
Naphthenes, vol %: 37.8
Aromatics, vol %: 7.9
Sulfur, wt %: 0.005

Kerosine
Range, °C.: 150—225
Yield, vol %: 14.38
Density @ 15/4 °C.: 0.778
Freeze pt, °C.: −55
Vis., cSt @ 34.4° C.: 5.07
Smoke pt, mm: 21
Sulfur, wt %: 0.006
Aromatics, vol %: 10.6

Gas oil
Range, °C.: 150—350
Yield, vol %: 38.59
Density @ 15/4 °C.: 0.809
Pour pt, °C.: −18
Vis., °Engler @ 50° C.: 1.78
Cetane index: 60.0
Diesel index: 71.8
Sulfur, wt %: 0.010
Aniline pt, °C.: 74.2

Residue
Range, °C.: 350+
Yield, vol %: 40.23
Density @ 15/4 °C.: 0.898
Pour pt, °C.: +36
Vis., cSt @ 50° C.: 86.4
Sulfur, wt %: 0.060
Asphaltenes, wt %: 0.08
Con. carbon, wt %: 2.96
V, ppm: 3

Mandji, Gabon

Cap Lopez terminal, loading berth, Prince's Bay

Crude
Gravity, °API: 30.5
Vis., cSt @ 10° C.,: 44.0
Pour pt, °C.: +3
Rvp @ 37.8° C., g/sq cm: 270
Total sulfur, wt %: 1.10
Asphaltenes, wt %: 0.3
Con. carbon, wt %: 5.40
UOP charac. factor: 12.1
V/Ni, kg/mg: 48/50
C_1—C_5, yield, vol %: 4.46

Gasoline
Range, °C.: 15—80
Yield, vol %: 5.38
RON, clear: 74.2

Heavy naphtha
Range, °C.: 80—150
Yield, vol %: 9.63
Paraffins, vol %: 55.2
Naphthenes, vol %: 36.7
Aromatics, vol %: 8.1
Sulfur, wt %: 0.006

Kerosine
Range, °C.: 150—225
Yield, vol %: 10.37
Density @ 15/4 °C.: 0.795
Freeze pt, °C.: −53
Smoke pt, mm: 24
Sulfur, wt %: 0.101
Aromatics, vol %: 17.3
Aniline pt, °C.: 56.1

Gas oil
Range, °C.: 150—375
Yield, vol %: 36.12
Density @ 15/4 °C.: 0.839
Pour pt, °C.: −15
Vis., cSt @ 50° C.: 2.28
Cetane index: 55.1
Diesel index: 59.7
Sulfur, wt %: 0.4
Aniline pt, °C.: 69.3

Heavy gas oil
Range, °C.: 375—525
Yield, vol %: 23.10
Density @ 15/4 °C.: 0.909
Pour pt, °C.: +37
Vis., cSt @ 50° C.: 50
Nitrogen, ppm: 480
Aniline pt, °C.: 85.4
Ni, ppm: <1
Sulfur, wt %: 1.14
Con. carbon, wt %: 0.45

Residue
Range, °C.: 375+
Yield, vol %: 46.96
Density @ 15/4 °C.: 0.952
V/Ni, ppm: 93/98
Pour pt, °C.: +36
Vis., cSt @ 50° C.: 2,100
Sulfur, wt %: 1.81
Asphaltenes, wt %: 0.49
Con. carbon, wt %: 10.2

Pennington, Nigeria

CALM with export from floating storage in offshore producing area

Crude
Gravity, °API: 36.6
Sulfur, wt %: 0.07

Vis., cSt @ 104° F.: 3.06
Pour pt, °F.: 43
C_4 & lighter, vol %: 1.5
Rvp @ 100° F., psi: 5.1
Con. carbon residue, wt %: 0.7
V/Ni, ppm: 2/1

Light naphtha
Range, °F.: C_5—200
Yield, vol %: 7.4
Sulfur, wt %: 0.001
Paraffins, vol %: 70.5
Naphthenes, vol %: 25.5
Aromatics, vol %: 3.5
RON, clear: 74.9

Heavy naphtha
Range, °F.: 200—340
Yield, vol %: 14.7
Sulfur, wt %: 0.001
P/N/A, vol %: 35.0/52.5/12.0
RON, clear: 55.5
Aniline pt, °F.: 118

Kerosine
Range, °F.: 340—470
Yield, vol %: 18.0
Gravity, °API: 40.6
Sulfur, wt %: 0.02
Vis., cSt @ 104° F.: 1.45
Smoke pt, mm: 19.5
Freeze pt, °F.: −69
Aniline pt, °F.: 135
Cloud pt, °F. <−76

Gas oil
Range, °F.: 470—650
Yield, vol %: 31.7
Gravity, °API: 33.7
Sulfur, wt %: 0.05
Vis., cSt @ 104° F.: 3.72
Pour pt, °F. −1.0
Aniline pt, °F.: 158
Cloud pt, °F.: 6.0

Vacuum gas oil
Range, °F.: 650—1,000
Yield, vol %: 23.4
Gravity, °API: 23.5
Sulfur, wt %: 0.15
Vis., cSt @ 122° F.: 28.9
Pour pt, °F.: 102
Aniline pt, °F.: 184
Con. carbon residue, wt %: 0.12
V/Ni, ppm: 2/<1

Residue
Range, °F.: 650+
Yield, vol %: 26.7
Gravity, °API: 21.8
Sulfur, wt %: 0.17
Vis., cSt @ 122° F.: 48.5
Pour pt, °F.: 91
Aniline pt, °F.: 179
Con. carbon residue, wt %: 2.3

Qua Iboe, Nigeria

CALM in offshore producing area

Crude
Gravity, °API: 35.8
Pour pt, °F.: 45
Kin. vis., cSt @ 59° F.: 6.76
@ 104° F.: 3.39
Con. carbon residue, wt %: 0.92
Aniline pt, °C.: 62.56
Sulfur, wt %: 0.12
Rvp, psi: 6.0
Nitrogen, total, ppm: 540
V/Ni, ppm: 0.3/3.3
C_5 & lighter, yield, vol %: 5.13

Light naphtha
Range (TBP), °F.: 60—180
Yield, vol %: 5.15
Rvp, psi: 10.3
Paraffins, vol %: 67.3
Naphthenes, vol %: 31.6
Aromatics, vol %: 1.1
Sulfur, wt %: 0.0008

Heavy naphtha
Range, °F.: 180—380
Yield, vol %: 25.14
Rvp, psi: 1.0
P/N/A, vol %: 34.6/55.3/10.1
RON, clear: 56.6
RON + 3 ml TEL/gal: 76.0
Sulfur, wt %: 0.026

Kerosine
Range, °F.: 330—444
Yield, vol %: 13.64
Gravity, °API: 41.2
P/N/A, vol %: 36.4/49.3/14.3
Freezing pt, °F.: −50
Smoke pt, mm: 20
Aniline pt, °F.: 132.1
Diesel index: 54
Cetane index: 39
Sulfur, wt %: 0.05

Light gas oil
Range, °F.: 380—710
Yield, vol %: 42.63
Gravity, °API: 33.1
Pour pt, °F: 15
Aniline pt, °F.: 151.4
Sulfur, wt %: 0.11

Heavy gas oil
Range, °F.: 710—850
Yield, vol %: 12.18
Gravity, °API: 22.7
Pour pt, °F.: 95
Kin. vis., cSt @ 100° F.: 68.55
Aniline pt, °F.: 178.7
Diesel index: 41
Sulfur, wt %: 0.16
Nitrogen, total, ppm: 679
Con. carbon, wt %: 0.02

Residue
Range, °F.: 710+
Yield, vol %: 24.65
Gravity, °F.: 17.9
Pour pt, °F.: 110
Kin. vis., cSt @ 100° F.: 900.93
Sulfur, wt %: 0.23
Nitrogen, total, ppm: 1,604
Con. carbon residue, wt %: 3.36
V/Ni, ppm: 1.2/13.1

Salt Pond, Ghana

SALM with hawser-moored permanent storage in offshore producing area

Crude
Gravity, °API: 37.4
Sulfur, wt %: 0.097
C_1—C_3 yield, vol %: 0.37

Gasoline
Range, °F.: 115—180
Yield, vol %: 9.23
RON, clear: 57.0

Gasoline
Range, °F.: 180—220
Yield, vol %: 2.90
RON, clear: 51.0

Naphtha
Range, °F.: 220—250
Yield, vol %: 2.50
RON, clear: 46.5

Naphtha
Range, °F.: 250—320
Yield, vol %: 7.20

Heavy naphtha
Range, °F.: 320—360
Yield, vol %: 4.30
Aniline pt, °F.: 138

Kerosine
Range, °F.: 360—500
Yield, vol %: 16.30
Gravity, °API: 43.7
Pour pt, °F.: −36
Sulfur, wt %: 0.020
Aniline pt, °F.: 148

Gas oil
Range, °F.: 500—600
Yield, vol %: 10.90
Gravity, °API: 37.3
Pour pt, °F.: 11
Sulfur, wt %: 0.030
Aniline pt, °F.: 163

Gas oil
Range, °F.: 600—650
Yield, vol %: 5.10
Gravity, °API: 34.4
Pour pt, °F.: 38
Sulfur, wt %: 0.070
Aniline pt, °F.: 173

Heavy gas oil
Range, °F.: 650—940
Yield, vol %: 21.20
Gravity, °API: 27.9
Sulfur, wt %: 0.110
Nitrogen, %: 0.0300

Vacuum bottoms
Range, °F.: 940+
Yield, vol %: 20.00
Gravity, °API: 17.6
Sulfur, wt %: 0.250
K factor: 11.89
Vis., Sfs @ 210° F.: 263.0

Soyo Blend, Angola

Quinfequena terminal

Crude
Gravity, °API: 33.7
Sulfur, wt %: 0.23
Pour pt, °C.: +18
Vis., cSt @ 37.8° C.: 10.08
Asphaltenes, wt %: 0.72
Total acidity, mg KOH/g: 0.07
Wax content, wt % @ —30° C.: 14.7
V/Ni, ppm: 5/15
C_1—C_5 (GLC), yield, wt %: 2.33

Gasoline
Range (TBP), °C.: C_5—80
Yield, vol %: 3.86
RON + 0.4 g TEL/l: 83.7

Heavy naphtha
Range, °C.: 80—150
Yield, vol %: 9.63
Density @ 15° C.: 0.745
Naphthenes, vol %: 37.2
Aromatics, vol %: 10

Kerosine
Range, °C.: 150—230
Density @ 15° C.: 0.793
Sulfur, wt %: 0.021
Freeze pt, °C.: −53
Aromatics, vol %: 16
Smoke pt, mm: 25
Naphthenic acids, ppm: 68

Gas oil
Range, °C.: 230—340
Yield, vol %: 19.99
Density @ 15° C.: 0.838

Sulfur, wt %: 0.12
Cloud pt, °C.: −8
Cetane index: 53.0
Vis., cSt @ 50° C.: 2.73

Heavy gas oil
Range, °C.: 340—510
Yield, vol %: 26.22
Density @ 15° C.: 0.8824
Sulfur, wt %: 0.24
Aniline pt, °C.: 94.0
Basic nitrogen, ppm: 298
Total nitrogen, wt %: 0.10
Con. carbon, wt %: 0.01
V/Ni, ppm: <2/<2

Residue
Range, °C.: 340+
Yield, vol %: 52.16
Density @ 15° C.: 0.920
Sulfur, wt %: 0.21
Vis., cSt @ 50° C.: 160.8
Con. carbon, wt %: 5.5

Zaire, Zaire

CALM with moored storage in offshore producing area

Crude
Gravity, °API: 31.7
Sulfur, wt %: 0.13
Vis., SUS @ 100° F.: 98.0
Pour pt, °F.: +80
C_4 & lighter, vol %: 1.00
Rvp, lb: 2.2
V/Ni, ppm: 1.5/17.8
Salt, lb/1,000 bbl: 6
ASTM, 50% pt, °F.: >590

Light naphtha
Range (TBP), °F.: Ibp—140*
Yield, vol %: 1.84
Sulfur, wt %: 0.037
RON, clear: 79.4

Light naphtha
Range, °F.: 140—170
Yield, vol %: 1.03
Sulfur, wt %: 0.020
Paraffins, vol %: 76.5
Naphthenes, vol %: 22.2
Aromatics, vol %: 1.3
RON, clear: 65.7

Heavy naphtha
Range, °F.: 170—310
Yield, vol %: 8.84
Sulfur, wt %: 0.006
P/N/A, vol %: 53.8/41.6/4.6
Aniline pt, °F.: 133.5

Kerosine
Range, °F.: 310—520
Yield, vol %: 16.31
Sulfur, wt %: 0.074
Freezing pt, °F.: −36
Aniline pt, °F.: 147.2
Cetane index: 50.0
Smoke pt, mm: 27

Light gas oil
Range, °F.: 520—680
Yield, vol %: 15.44
Vis., SUS @ 100° F.: 45.0
Sulfur, wt %: 0.14
Pour pt, °F.: +45
Diesel index: 62.4
Cetane index: 62.0

Heavy gas oil
Range (TBP to EFV), °F.: 680—1,000
Yield, vol %: 31.39
Gravity, °API: 26.7
Vis., SUS @ 210° F.: 54.0
Sulfur, wt %: 0.12
Total nitrogen, ppm: 1,010
Pour pt, °F.: +115
Aniline pt, °F.: 214.3
V/Ni, ppm: 0.1/0.3

Residual oil
Range, °F.: 680+
Yield, vol %: 55.65
Gravity, °API: 21.4
Vis., SUS @ 210° F.: 181.9
Sulfur, wt %: 0.17
Con. carbon res., wt %: 6.03
Pour pt, °F.: +100
V/Ni, ppm: 2.5/30
*Does not include C_4 and lighter

North Africa

Amna (high pour), Libya

Ras Lanuf/CBMs & SPM

Crude
Gravity, °API: 36.1
Sulfur, wt %: 0.15
Pour pt, °F.: 75
Kin. vis., cSt @ 37.8° C.: 13.70
Car. residue (CCR), wt %: 3.7
Rvp, psi: 3.9
Salt, lb/1,000 bbl: 8.2
V/Ni, ppm: 0.6/5.0
Ibp-60° F., yield, vol %: 2.11

Light naphtha
Range, °F.: 60-120
Yield, vol %: 2.4
Gravity, °API: 93.6
Sulfur, wt %: 0.01
Paraffins, vol %: 99.0
Naphthenes, vol %: 1.0
RON, clear: 78.0
RON + 3 ml TEL: 94.0

Light naphtha
Range, °F.: 120-250
Yield, vol %: 7.7
Gravity, °API: 69.5
Sulfur, wt %: 0.01
Paraffins, vol %: 69.9
Naphthenes, vol %: 26.5
Aromatics, vol %: 3.7

Heavy naphtha
Range, °F.: 250-330
Yield, vol %: 6.9
Gravity, °API: 57.4
Sulfur, wt %: 0.02
P/N/A, vol %: 60.5/33.6/5.9

Kerosine
Range, °F.: 330-443
Yield, vol %: 9.4
Gravity, °API: 49.9
Sulfur, wt %: 0.05
P/N/A, vol %: 60.9/29.9/9.2
Pour pt, °F.: −75
Freezing pt, °F.: −58
Aniline pt, °F.: 150.6
Diesel index: 75
Smoke pt, mm: 31

Gas oil
Range, °F.: 443-600
Yield, vol %: 15.0
Gravity, °API: 42.3
Sulfur, wt %: 0.07
Pour pt, °F.: 0
Aniline pt, °F.: 169.1
Diesel index: 71

Gas oil
Range, °F.: 600-850
Yield, vol %: 23.3
Sulfur, wt %: 0.13
Pour pt, °F.: 80
Aniline pt, °F.: 202.0
Diesel index: 69

Residual oil
Range, °F.: 655+
Yield, vol %: 55.4
Gravity, °API: 25.4
Sulfur, wt %: 0.22
Pour pt, °F.: 100
Car. residue CCR, wt %: 6.22
V/Ni, ppm: 1.1/8.5

Residual oil
Range, °F.: 1,000+
Yield, vol %: 21.8
Gravity, °API: 16.7
Sulfur, wt %: 0.31
Pour pt, °F.: 130
Car. residue CCR, wt %: 14.50
V/Ni, ppm: 2.5/20.0

Ashtart, Tunisia

Floating storage barge in Gulf of Gabes producing area

Crude
Gravity, °API: 29.03
Vis. @ 20° C., cSt: 24.0
Pour pt, °C.: +9
Rvp @ 38.7° C., g/sq cm: 130
Total sulfur, wt %: 1.0
Paraffins/Asphaltenes, wt %: 11.0/1.8
Con. carbon, wt %: 5.4
>C_1-C_5, vol %: 1.26
V/Ni, mg/kg: 20/9

Light naphtha
Range (TBP), °C.: 15-100
Yield, vol %: 5.65
Density, 15/4 °C.: 0.702
Rvp, g/sq cm: 500
RON, clear: 63.6
Aromatics, vol %: 10.0

Heavy naphtha
Range (TBP), °C.: 100-145
Yield, vol %: 6.42
Density, 15/4 °C.: 0.759
Paraffins, vol %: 47.2
Naphthenes, vol %: 37.8
Aromatics, vol %: 15.0
Sulfur, wt %: 0.0055

Heavy naphtha
Range (TBP), °C.: 145-180
Yield, vol %: 5.91
Density, 15/4 °C.: 0.785
P/N/A, vol %: 46.5/33.8/19.7
Sulfur, wt %: 0.0120

Kerosine
Range (TBP), °C.: 180-225
Yield, vol %: 6.65
Density, 15/4 °C.: 0.812
Freeze pt, °C.: −54
Vis., cSt @ 50° C.: 1.10
Smoke pt, mm: 21
Sulfur, wt %: 0.04
Aniline pt, °C.: 54.0
Aromatics, vol %: 18.9

Gas oil
Range (TBP), °C.: 145-350
Yield, vol %: 36.04
Density, 15/4 °C.: 0.834
Pour pt, °C.: −21
Cloud pt, °C.: −16
Filterability, °C.: −19
Vis, cSt @ 50° C.: 1.9
Cetane index: 48.8
Sulfur, wt %: 0.44
Diesel index: 54.7
Aniline pt, °C.: 62.0
Con. carbon @ 10%, wt %: <0.05

Residue
Range (TBP), °C.: 350+
Yield, vol %: 51.90
Density, 15/4 °C.: 0.943
Pour pt, °C.: +18
Vis. cSt, @ 50° C.: 225
Sulfur, wt %: 1.42
Con. carbon, wt %: 9.4
V/Ni, ppm: 34/17
N, wt %: 0.40

Brega, Libya

Marsa el-Brega/ CBM, SPM, SBM

Crude
Gravity, °API: 40.4
Sulfur, wt %: 0.21
Pour pt, °F.: +30
Rvp, psi: 6.4
Kin., cSt @ 70° F.: 5.58
@ 100° F.: 3.56

Light naphtha
Range, °F.: 68-212
Yield, vol %: 12.4
Gravity, °API: 73.8
Sulfur, wt %: 0.014
Rvp, psi: 7.4
Paraffins, vol %: 72.5
Naphthenes, vol %: 25.3
Aromatics, vol %: 2.2
RON, clear: 65.1

Heavy naphtha
Range, °F.: 212-302
Yield, vol %: 10.7
Gravity, °API: 56.8
Sulfur, wt %: 0.020
P/N/A, vol %: 53.1/39.4/7.5

Kerosine
Range, °F.: 302-455
Yield, vol %: 17.4
Gravity, °API: 46.7
Sulfur, wt %: 0.035
P/N/A, vol %: 51.2/34.7/14.1
Freeze pt, °F.: −70
Smoke pt, mm: 27
Luminometer no.: 61
Aniline pt, °F.: 144
Kin. vis., cSt @ 30° F.: 5.50
@ 100° F.: 1.17

Light gas oil
Range, °F.: 455-650
Yield, vol %: 20.3
Gravity, °API: 38.1
Sulfur, wt %: 0.10
Pour pt, °F.: +15
Aniline pt, °F.: 172
Kin. vis., cSt @ 100° F.: 3.61

Heavy gas oil
Range, °F.: 650-1,049
Yield, vol %: 27.8
Gravity, °API: 27.7
Sulfur, wt %: 0.30
Pour pt, °F.: 105
Aniline pt, °F.: 206
Kin. vis., cSt @ 150° F.: 14.9

Residual oil
Range, °F.: 650+
Yield, vol %: 36.8
Gravity, °API: 23.6
Sulfur, wt %: 0.41
Pour pt, °F.: 95
Con. carbon wt %: 4.1
Kin. vis., cSt @ 100° F.: 184
@ 122° F.: 92.0

Residual oil
Range, °F.: 1,049+
Yield, vol %: 9.0
Gravity, °API: 12.3
Sulfur, wt %: 0.69
Pour pt, °F.: >120
Con. carbon, wt %: 14.6
Kin. vis., cSt @ 210° F.: 620
V/Ni/Fe, ppm: 24/32/124

Bu Attifel, Libya

Zueitina/CBM & SBM

Crude
Gravity, °API: 43.6
Rvp, psi: 0
Sulfur, wt %: 0.034
Pour pt, °F.: +90

Light ends
Range vapor temp., °F.: Ibp-160
Yield, vol %: 2.5

Light naphtha
Range, vapor temp., °F.: 160-290
Yield, vol %: 9.0
Gravity, °API: 62.5
Paraffins, vol %: 75.4
Olefins, vol %: 0.4
Naphthenes, vol %: 18.3
Aromatics, vol %: 5.9

Heavy naphtha
Range, VT, °F.: 290-390
Yield, vol %: 9.0
Gravity, °API: 56.8
Sulfur, wt %: 0.0015
P/O/N/A, vol %: 75.7/0.4/17.8/6.1

Kerosine
Range, VT, °F.: 390-500
Yield, vol %: 11.7
Gravity, °API: 50.3
Sulfur, wt %: 0.005
Aromatics, vol %: 5.6
Smoke pt, mm: 22
Freeze pt, °F.: 9.4
Pour pt, °F.: −10

Diesel
Range, VT, °F.: 500-635
Yield, vol %: 11.3
Gravity, °API: 44.0
Sulfur, wt %: 0.0140
Vis., SSU @ 100° F.: 38.4
Aniline pt, °F.: 192.5
Diesel index: 84.7
Pour pt, °F.: 45

Lt. gas oil
Range, VT, °F.: 635-775
Yield, vol %: 20.7
Gravity, °API: 41.6
Sulfur, wt %: 0.03
Vis., SSU @ 100° F.: 49.5
Pour pt, °F.: +85
UOP "K" factor: 12.6

Heavy gas oil
Range, VT, °F.: 775-932
Yield, vol %: 20.6
Gravity, °API: 37.4
Sulfur, wt %: 0.04
Vis., SSF @ 210° F.: 41.6
Pour pt, °F.: +125
UOP "K" factor: 12.8

Residue
Range, °F.: 932+
Yield, vol %: 15.2
Gravity, °API: 29.2
Sulfur, wt %: 0.10
Carbon residue, wt %: 1.5

El Borma, Tunisia

La Skhirra, Tunisia

Crude
See Algerian Zarzaitine assay. One blend has two names.

Es Sider, Libya

Es Sider/3 CBMs, 1 SBM

Crude
Gravity, °API: 36.7
Kin. vis., cSt @ 100° F.: 5.26
Con. carbon residue, wt %: 1.8
Sulfur, wt %: 0.37
V/Ni, ppm: 1.5/5.6
Pour pt, °C.: +7.2
Rvp, psi: 6.3
C_4 & lighter, vol %: 2.3

Naphtha
Range (TBP), °F.: 82-342
Yield, vol %: 22.2
Gravity, °API: 64.8
Paraffins, vol %: 57.8
Naphthenes, vol %: 36.5
Sulfur, wt %: 0.03

Kerosine
Range (TBP), °F.: 342-472
Yield, vol %: 11.3
Gravity, °API: 46.3
Sulfur, wt %: 0.13
Aromatics, vol %: 13

Heavy distillate
Range (TBP), °F.: 472-705
Yield, vol %: 28.0
Gravity, °API: 35.7
Sulfur, wt %: 0.31

Gas oil
Range (TBP), °F.: 705-980
Yield, vol %: 20.3
Gravity, °API: 25.5
Sulfur, wt %: 0.48

Residue
Range (TBP), °F.: 980+
Yield, vol %: 15.9
Gravity, °API: 12.3
Sulfur, wt %: 1.16
Kin. vis., cSt @ 210° F.: 500
Con. carbon residue, wt %: 14.7
V/Ni, ppm: 8/30

Saharan Blend,* Algeria

Arzew (3 CBMs)
Bejaia (4 jetties)
Skikda

Crude
Gravity, °API: 45.5 (43.7)
Rvp, psi: 8.7 (8.1)
Sulfur, wt %: 0.053 (0.090)
Pour pt, °F.: <−20 (<−20)
Vis. SSU @ 70° F.: 37.3 (40.1)

Light ends
Range, vapor temp., °F.: Ibp-160
Yield, vol %: 10.4 (9.9)

Light naphtha
Range, vapor temp., °F.: 160-290
Yield, vol %: 18.3 (14.9)
Gravity, °API: 64.0 (63.7)
Paraffins, vol %: 70.8 (70.2)
Olefins, vol %: 0.3 (0.4)
Naphthenes, vol %: 21.8 (23.4)
Aromatics, vol %: 7.1 (6.0)

Heavy naphtha
Range, VT, °F.: 290-390
Yield, vol %: 13.7 (14.5)
Gravity, °API: 53.3 (52.1)
P/O/N/A, vol %: 47.4/0.3/36.4/15.9 (55.0/0.3/29.6/15.1)

Kerosine
Range, VT, °F.: 390-500
Yield, vol %: 14.1 (13.4)
Gravity, °API: 44.6 (44.0)
Sulfur, wt %: 0.0056 (0.0030)
Aromatics, vol %: 15.8 (16.4)
Smoke pt, mm: 17 (21)
Freeze pt, °F.: −38.2 (−42.7)

Diesel
Range, VT, °F.: 500-635
Yield, vol %: 12.7 (12.8)
Gravity, °API: 36.6 (35.1)
Sulfur, wt %: 0.0571 (0.0736)
Vis. SSU @ 100° F.: 41.6 (40.3)
Pour pt, °F.: +15 (+5)
Aniline pt, °F.: 170 (165.5)
Diesel index: 62.2 (58.1)

Light gas oil
Range, VT, °F.: 635-775
Yield, vol %: 9.3 (14.3)
Gravity, °API: 31.1 (31.7)
Sulfur, wt %: 0.07 (0.13)
Vis. SSU @ 100° F.: 57.5 (63.0)
Pour pt, °F.: +50 (+40)

Heavy gas oil
Range, VT, °F.: 775-932
Yield, vol %: 12.0 (10.0)
Gravity, °API: 28.6 (26.5)
Sulfur, wt %: 0.10 (0.18)
Vis., SSU @ 210° F.: 49.6 (54.5)
Pour pt, °F.: +90 (+90)
Carbon residue, wt %: 0.05 (0.06)

Residue
Range, VT, °F.: 932+
Yield, vol %: 9.5 (10.2)
Gravity, °API: 21.2 (19.9).
Sulfur, wt %: 0.22 (0.28)
Vis., SSF, @ 210° F.: 38.0 (45.1)
Carbon residue, wt %: 6.8 (7.4)

*Gravity of Saharan Blend has not been consistent. Values in parenthesis are those for 43.7 °API blend.

Sarir, Libya

Marsa al Hariga (Tobruk)/CBM

Crude
Gravity, °API: 38.3
Sulfur, wt %: 0.18
Pour pt, °F.: 25
Kin. vis. cSt @ 50° C.: 4.73
Yield, C_2-C_4, vol %: 3.82
V/Ni, ppm: 6/14

Naphtha
Range, °C.: Ibp-180
Yield, vol %: 22.89
Total sulfur, ppm: 14
Paraffins, vol %: 60.8
Naphthenes, vol %: 35.8
Aromatics, vol %: 3.4

Kerosine
Range, °C.: 180-250
Yield, vol %: 11.27
Total sulfur, ppm: 83
Smoke pt, mm: 30

Gas oil
Range, °C.: 250-320
Yield, vol %: 10.99
Total sulfur, wt %: 0.063
Pour pt, °C.: −6
Aniline pt, °C.: 80

Resid
Range, °C.: 320+
Yield, vol %: 51.41
Total sulfur, wt %: 0.24
Vis. cSt @ 60° C.: 49
Con. carbon, wt %: 6.8

Resid
Range, °C.: 550+
Yield, vol %: 17.25
Total sulfur, wt %: 0.35
Con. carbon, wt %: 20
Asphaltenes, wt %: 4.7

Sirtica, Libya

Ras Lanuf/CBMs & SBM

Crude
Gravity, °API: 43.3
Total sulfur, wt %: 0.43
Pour pt, °C.: −3
Yield C_2-C_4, wt %: 3.24
Rvp, psi: 10.1

Condensate
Yield, vol %: 42

Naphtha
Range, °C.: Ibp-180
Yield, vol %: 39.7
Gravity, °API: 62.8
Total sulfur, wt %: 0.015
P/N/A, vol %: 69.7/22.8/7.5

Gas oil
Range, °C.: 180-350
Yield, vol %: 29.8
Gravity, °API: 38.7
Total sulfur, wt %: .21
Pour pt, °C.: −15

Resid
Range, °C.: 350+
Yield, vol %: 25.5
Gravity, °API: 19.1
Total sulfur, wt %: 1.16
Vis. cSt @ 180° F.: 39.0
Pour pt, °C.: 39
Con. carbon, wt %: 5.7

Zarzaitine, Algeria

La Skhirra, Tunisia

Crude
Gravity, °API: 43.0
Vis. cSt @ 10° C.: 6.90
Pour pt, °C.: −12
Rvp @ 37.8° C., g/sq cm: 603
Total sulfur, wt %: 0.07
Paraffins, wt %: 4.89
Con. carbon, wt %: 0.90
V/Ni, mg/kg: 1/3
Yield C_1-C_5, vol %: 7.31

Light naphtha
Range, °C.: C_5-80
Yield, vol %: 8.94
Density, 15/4 °C.: 0.662
RON, clear: 68.8
MON, clear: 64.6
Aromatics, vol %: 0.9

Heavy naphtha
Range, °C.: 80-145
Yield, vol %: 15.13
Density, 15/4 °C.: 0.738
Paraffins, vol %: 59.4
Naphthenes, vol %: 33.9
Aromatics, vol %: 6.7
Sulfur, wt %: 0.0138

Kerosine
Range, °C.: 145-225
Yield, vol %: 16.58
Density, 15/4 °C.: 0.784
Freeze pt, °C.: −65
Vis. cSt @ 34.4° C.: 4.50
Smoke pt, mm: 25
Sulfur, wt %: 0.0162
Aromatics, vol %: 14.2

Gas oil
Range, °C.: 225-290
Yield, vol %: 12.55
Density, 15/4 °C.: 0.822
Pour pt, °C.: −36
Cloud pt, °C.: −27
Filterability, °C.: −34
Vis. cSt @ 50° C.: 1.95
Sulfur, wt %: 0.025

Gas oil
Range, °C.: 290-350
Yield, vol %: 10.89
Density, 15/4 °C.: 0.843
Pour pt, °C.: −3
Vis. cSt @ 50° C.: 4.18
Sulfur, wt%: 0.045

Residue
Range, °C.: 350+
Yield, vol %: 32.47
Pour pt, °C.: +21
Density, 15/4 °C.: 0.899
Vis., cSt @ 50° C.: 80
Sulfur, wt %: 0.155
Asphaltenes, wt %: 0.21
Con. carbon, wt %: 2.48
V, ppm: 2.5

Zueitina, Libya

Zueitina/CBMs & SBM

Crude
Gravity, °API: 41.3
Rvp, psi: 4.6
Sulfur, wt %: 0.28
Pour pt, °F.: 45
Vis. SSU @ 60° F.: 199.1

Light ends
Range, °F.: Ibp–113
Yield, vol %: 6.44

Light naphtha
Range, °F.: 113-220
Yield, vol %: 9.32
Gravity, °API: 66.9
Paraffins, vol %: 65.5
Naphthenes, vol %: 30.9
Aromatics, vol %: 3.6

Naphtha
Range, °F.: 220-390
Yield, vol %: 21.42
Gravity, °API: 53.9
Sulfur, wt %: 0.04
P/N/A, vol %: 59.2/27.0/10.2

Kerosine
Range, °F.: 315-500
Yield, vol %: 21.65

Gravity, °API: 45.6
Total sulfur, wt %: 0.11
Aromatics, vol %: 14.0
Smoke pt, mm: 27
Freeze pt, °F.: −36
Pour pt, °F.: −45

Light distillate
Range, °F.: 390-550
Yield, vol %: 18.16
Gravity, °API: 41.7
Cetane index: 53.0
Total sulfur, wt %: 0.17
Aniline pt, °F.: 159.0
Pour pt, °F.: −10

Light gas oil
Range, °F.: 450-650
Yield, vol %: 21.17
Gravity, °API: 38.4
Cetane index: 57.8
Total sulfur, wt %: 0.24
Total nitrogen, ppm: 78
Aniline pt, °F.: 173.0
Pour pt, °F.: 25

Heavy gas oil
Range, °F.: 650-1,000
Yield, vol %: 24.09
Gravity, °API: 29.1
Sulfur, wt %: 0.36
Total nitrogen, ppm: 922
Pour pt, °F.: 100
Carbon residue, wt %: 0.18

Vacuum flashed resid
Range, °F.: 1,000+
Yield, vol %: 10.11
Gravity, °API: 13.5
Total sulfur, wt %: 0.90

Asia

Ardjuna, Indonesia

SBM 18.5 miles off north coast of Java in producing area

Crude
Gravity, °API: 35.2
Sulfur, wt %: 0.105
Pour pt, °F.: 75
Rvp, lb: 5.3
Kin. vis. @ 100° F.: 3.738
Carbon residue, wt %: 1.38
V/Ni, ppm: <1/3
Nitrogen, ppm: 280
Yield, C_4 & lighter, vol %: 2.6

Naphtha
Range (TBP), °F.: C_5—150
Yield, vol %: 5.0
Sulfur, wt %: 0.005
RON, clear: 76.6
RON + 0.5 g TEL/gal: 82.7
MON, clear: 74.8

Heavy naphtha
Range, °F.: 150-380
Yield, vol %: 27.2
Gravity, °API: 50.8
Sulfur, wt %: 0.012
Paraffins, vol %: 34.3
Naphthenes, vol %: 46.0
Aromatics, vol %: 19.7
RON, clear: 64.6
MON, clear: 63.0

Distillate
Range, °F.: 380-520
Yield, vol %: 16.4
Gravity, °API: 33.0
Sulfur, wt %: 0.059
Pour pt, °F.: −65
Cetane no.: 36.3
Smoke pt, °F.: 12.5
Freezing pt, °F.: −39.5
Aromatics, vol %: 34.6
Total N, ppm: 4.0
Cloud pt, °F.: −46
Vis., cSt @ 100° F.: 1.967

Distillate
Range, °F.: 520-650
Yield, vol %: 14.0
Gravity, °API: 30.7
Sulfur, wt %: 0.099
Pour pt, °F.: −65
Cetane no.: 47.0
Total N, ppm: 33.0
Cloud pt, °F.: −26
Vis., cSt @ 100° F.: 4.689

Blended gas oil
Range, °F.: 650-840
Yield, vol %: 16.9
Gravity, °API: 25.1
Sulfur, wt %: 0.156
Aniline pt, °C.: 86.7
Pour pt, °F.: 90
Kin. vis. @ 210° F.: 3.983
Carbon residue, wt %: 0.02
Total nitrogen, ppm: 200

Residue
Range, °F.: 650+
Yield, vol %: 34.8
Gravity, °API: 21.1
Sulfur, wt %: 0.199
Carbon residue, %: 2.94
Total nitrogen, ppm: 670
Pour pt, °F.: 100
Kin. vis. @ 210° F.: 5.414

Vacuum residue
Range: Bottoms from vacuum flashed 650+ °F. resid @ 725° F.
Yield, vol %: 5.9
Gravity, °API: 5.1
Sulfur, wt %: 0.292
Carbon residue, wt %: 17.86
V/Ni, ppm: 7/30

Arimbi, Indonesia

Balongan sea terminal/SBM about 6.5 nautical miles off north coast of Java

Crude
Gravity, °API: 31.8
Sulfur, wt %: 0.204
Pour pt, °F.: 100
Vis., cSt @ 100° F.: 12.54
Carbon residue, wt %: 2.41
V/Ni, ppm: 0.9/2.6
Nitrogen, ppm: 531

Naphtha
Range (TBP), °F.: C_5—230
Yield, vol %: 10.6
Sulfur, wt %: <0.001
RON, clear: 64.6
RON + 0.5 g TEL/gal: 71.7

Naphtha
Range, °F.: 230-335
Yield, vol %: 11.2
Sulfur, wt %: 0.030
Total nitrogen, ppm: 1
Paraffins, vol %: 42.3
Naphthenes, vol %: 47.0
Aromatics, vol %: 10.7

Distillate
Range, °F.: 335-520
Yield, vol %: 17.3
Gravity, °API: 34.6
Sulfur, wt %: 0.107
Cetane no.: 37.3
Smoke pt, °F.: 14
Freezing pt, °F.: −32
Aromatics, vol %: 35.3

Distillate
Range, °F.: 520-650
Yield, vol %: 14.7
Gravity, °API: 31.6
Sulfur, wt %: 0.213
Pour pt, °F.: 45
Cetane no.: 50.2
Cloud pt, °F.: 50
Vis., cSt @ 100° F.: 5.450

Blended gas oil
Range, °F.: 650-840
Yield, vol %: 15.9
Gravity, °API: 29.0
Sulfur, wt %: 0.168
Aniline pt, °C.: 93.4
Pour pt, °F.: 110
Vis., cSt @ 210° F.: 4.385
Carbon residue, %: 0.008
Nitrogen, ppm: 266

Residue
Range, °F.: 650+
Yield, vol %: 45.9
Gravity, °API: 20.5
Sulfur, wt %: 0.240
Carbon residue, %: 5.27
Total nitrogen, ppm: 1,010
Pour pt, °F.: 120+
Vis. @ 210° F. (D2170): 22.29
V/Ni, ppm: 2.7/9.8

Attaka, Indonesia

Santan marine terminal about 80 miles north of Balikpapan, Kalimantan/SBM about 4 miles offshore

Crude
Gravity, °API: 42.3
Vis., cSt @ 70° F.: 1.7
Pour pt, °F.: −10
Rvp @ 100° F., psi: 6.8
Total acid no., Mg KOH/g: 0.20
Sulfur, wt %: 0.09
Wax, wt %: 4.22
Con. carbon residue, wt %: 0.34
Charac. factor, K UOP: 11.5

Naphtha
Range, °C.: C_5—100
Yield, vol %: 15.3
RON, clear: 74.9

Naphtha
Range, °C.: 100-150
Yield, vol %: 17.6
Paraffins, vol %: 41
Naphthenes, vol %: 35
Aromatics, vol %: 24.7

Kerosine
Range, °C.: 150-250
Yield, vol %: 29.6
Smoke pt, mm: 16
Freezing pt, °C.: −54

Gas oil
Range, °C.: 250-350
Yield, vol %: 25
Diesel index: 51
Cetane no.: 52.6

Fuel oil
Range, °C.: 350+
Yield, vol %: 12.5
Sulfur, wt %: 0.11
Pour pt, °F.: 100

Note: Attaka is mixed wtih Badak crude and other streams and shipped with Attaka specifications

Badak, Indonesia

Santan terminal about 80 miles north of Balikpapan, Kalimantan/SBM some 4 miles offshore

Crude
Gravity, °API: 41.3
Vis., cSt @ 100° F.: 5.72
Pour pt, °F.: −15
Rvp @ 100° F., psi: 5.6
Total acid number, mg KOH/g: 0.11
Sulfur, wt %: 0.08
Wax, wt %: 7.35
Con. carbon, wt %: 0.313
Charac. factor, K UOP: 12.5
Note: Badak is mixed with Attaka crude and shipped with Attaka specifications.

Bekapai, Indonesia

Senipah marine terminal about 27 miles northeast of Balikpapan, Kalimantan/SBM about 6 miles offshore

Crude
Gravity, °API: 40
Sulfur, wt %; 0.08
Pour pt, °C.: −21
Rvp, psi: 1.9
Vis.,cSt @ 37.8° C.: 2.02
Con. carbon, wt %: 0.25
Asphaltenes, wt %: <0.05
V/Ni, ppm: <0.5/<0.5
Yield C_4 & lighter, wt %: 0.51

Gasoline
Range, °C.: C_5—100
Yield, wt %: 8.17
Gravity, °API: 63.6
Sulfur, ppm: <1
Paraffins, vol %: 45.8
Naphthenes, vol %: 47.6
Aromatics, vol %: 6.6
RON, clear: 73.8
RON + 0.6 g TEL/l: 88.5

Naphtha
Range, °C.: 100-185
Yield, wt %: 25.12
Gravity, °API: 49.1
Sulfur, ppm: 68
P/N/A, vol %: 33.2/48.9/17.9

Kerosine
Range, °C.: 185-230
Yield, wt %: 15.98
Gravity, °API: 42.5
Sulfur, wt %: 0.038
Aromatics, vol %: 18
Smoke pt, mm: 22
Freezing pt., °C.: −50.5

Gas oil
Range, °C.: 185-375
Yield, wt %: 52.06
Gravity, °API: 37.5
Sulfur, wt %: 0.083
Vis., cSt @ 37.8° C.: 2.62
Aniline pt, °C.: 67.6
Pour pt, °C.: −21

Residue
Range, °C.: 375+
Yield, wt %: 14.14
Gravity, °API: 18.9
Sulfur, wt %: 0.22
Vis., cSt @ 50° C.: 835
Pour pt, °C.: >+45
Con. carbon, wt %: 1.7
V/Ni, ppm: <2/2

Bekok, Malaysia

Piped ashore to terminal north of Chukai, Kuala Trengganu area, peninsular Malaysia as part of Tapis Blend

Crude
Gravity, °API: 49.07
Vis., cSt @ 100° F.: 1.74
Pour pt, °F.: 26
Sulfur, ppm: 210
Total nitrogen, wt %: 0.0136
Neutralization no., mg KOH/g: 0.035
Rvp, psi: 7.6
Con. carbon residue, wt %: 0.22
V/Ni, ppm: <l/<l
Wax, wt %: 6.05
Yield, C_4 & lighter: 2.7

Light naphtha
Range, °F.: C_5-145
Yield (VT), vol %: 7.05
RON, clear: 72

Heavy naphtha
Range, °F.: 145-330
Yield, vol %: 26.76
Sulfur, ppm: 5
Total nitrogen, ppm: 0.7
RON, clear: 45
Paraffins, wt %: 57.40
Naphthenes, wt %: 29.27
Aromatics, wt %: 13.33

Kerosine
Range, °F.: 330-450
Yield, vol %: 15.74
Sulfur, ppm: 20
Freezing pt, °F.: −45
Cloud pt, °F.: −47
Smoke pt, mm: 20
Cetane index: 57.33
Diesel index: 76.48
Vis., cSt @ 70° F.: 1.64

Distillate
Range, °F.: 450—650
Yield, vol %: 26.13
Gravity, °API: 41.65
Sulfur, ppm: 220
Cetane index: 64.34
Diesel index: 74.34
Aniline pt, °C.: 81.5
Vis., cSt @ 70° F.: 5.15

Heavy gas oil
Range, °F.: 680-975
Yield, vol %: 15.85
Gravity, °API: 32.84
Sulfur, ppm: 600
Total nitrogen, ppm: 533
Pour pt, °F.: 113
Con. carbon residue, wt %: 0.059
Sodium, ppm: 13.84
V/Ni, ppm: 0.008/<0.01
Vis., cSt @ 130° F.: 11.32

Atmospheric residue
Range, °F.: 650+
Yield, vol %: 21.62
Gravity, °API: 31.54
Sulfur, ppm: 700
Pour pt, °F.: 113
Con. carbon residue, wt %: 1.986
Sodium, ppm: 0.125
V/Ni, ppm: <0.002/<0.01
Vis., cSt @ 130° F.: 27.37

Note: Bekok is contributor to Tapis blend

Bintulu, Malaysia

Bintulu SBM terminal off Sarawak

Crude
Gravity, °API: 26.5
Vapor pressure, Kg/sq cm: 0.21
Pour pt, °C.: −5.0
Vis., cSt @ 56° C.: 4.54
Carbon residue, wt %: 1.69
Sulfur, wt %: 0.13
Acid no. KOH mg/g: 0.43
Nitrogen, ppm: 450
Distillation, °C.:
Ibp—28
5%—104
10%—135
15%—169
20%—199
25%—227
30%—245
35%—259
40%—273
45%—285
47%—290

Note: Bintulu comes solely from Temana field offshore Sarawak

Bunyu, Indonesia

Bunyu Island terminal off east coast of Kalimantan/Four point CBM

Crude
Gravity, °API: 31.7
Vis., cSt @ 100° F.: 2.67
Pour pt, °F.: 60
Rvp @ 100° F., psi: 1.0
Sulfur, wt %: 0.09
Wax, wt %: 8.3
Con. carbon residue, wt %: 0.39
Charac. factor, K UOP: 11.4

Gasoline
Range, °C.: C_5—175
Yield, vol %: 18.5
RON, clear: 74.9

Kerosine
Range, °C.: 175-300
Yield, vol %: 49.0
Smoke pt, mm: 10

Gas oil
Range, °C.: 300-350
Yield, vol %: 13.0
Diesel index: 41

Residue
Range, °C.: 350+
Yield, vol %: 19.5
Sulfur, wt %: 0.20
Pour pt, °F.: 115

Note: In late 1982 there were plans to mix Bunyu with Sembakung crude (37 °API). This assay of sample that did not contain Sembakung.

Champion Export, Brunei

Seria SBM

Crude
Gravity, °API: 23.9
Vis. @ 10° C., sq mm/sec: 21.1
Sulfur, wt %: 0.12
Wax, wt %: 0.4
Pour pt, °C.: < −36
Total acid no., mg KOH/g: 0.50
UOP K factor: 11.2
Yield light hydrocarbons, wt %: 0.70

Gasoline
Range, °C.: C_5—65
Yield, vol %: 0.4
Rvp, kPa: 70

Naphtha
Range, °C.: 65—100
Yield, vol %: 2.0
Sulfur, mg/kg: 24
RON, clear: 77
RON + 0.5 g Pb/l (TEL): 88

Naphtha
Range, °C.: 100-150
Yield, vol %: 4.5
SUlfur, mg/kg: 74
RON, clear: 71
Paraffins, wt %: 20
Naphthenes, wt %: 69
Aromatics, wt %: 11

Naphtha
Range, °C.: 150-200
Yield, vol %: 8.1
Density @ 15° C., kg/i: 0.827
Sulfur, mg/kg: 251
P/N/A, wt %: 15/69/16
Smoke pt, mm: 22

Kerosine
Range, °C.: 200-250
Yield, vol %: 16.2
Density @ 15° C.: 0.870
Sulfur, wt %; 0.06
Cloud pt, °C. < −60
Smoke pt, mm: 18
Aniline pt, °C.: 46.9
Cetane no.: 31

Gas oil
Range, °C.: 250-300
Yield, vol %: 22.6
Density @ 15° C., kg/l: 0.899
Vis. @ 40° C., sq mm/sec: 3.84
Pour pt, °C.: −57
Aromatics, wt %: 36
Smoke pt, mm: 15
Cetane no.: 29

Gas oil
Range, °C.: 300-350
Yield, vol %: 15.2
Density @ 15° C., kg/l: 0.930
Vis. @ 40° C., sq mm/sec: 10.2
Sulfur, wt %: 0.17

Heavy gas oil
Range, °C.: 350-370
Yield, vol %: 4.3
Density @ 15° C., kg/l: 0.951
Pour pt, °C.: −6
Total nitrogen, mg/kg: 194

Residue
Range, °C.: 370+
Yield, vol %: 26.4
Density @ 15° C.; kg/l: 0.991
Vis. @ 60° C., sq mm/sec: 912
Sulfur, wt %: 0.25
Pour pt, °C.: 21
V/Ni, mg/kg: <1/3

Note: Assay sample contained 67 vol % Champion crude, 18 vol % Magpie, and 15 vol % Seria Land Heavy.

Cinta, Indonesia

SBM and floating storage barge in Java Sea producing area

Crude
Gravity, °API: 33.4
Sulfur, wt %: 0.075
Pour pt, °F.: 105
Vis., cSt @ 100° F.: 64.34
Rvp, lb: 1.4
V/Ni, ppm: 0.1/9.5
Wax content, wt %: 30.3
C_5 & lighter, vol %: 3.143

Light naphtha
Range, °F.: C_5-180
Yield, vol %: 1.89
Sulfur, ppm: 2.3
RON, clear: 61.0
RON + 3 ml TEL/gal: 84.8

Naphtha
Range, °F.: 180-300
Yield, vol %: 4.84
Sulfur, ppm: 5.1
RON, clear: 48.4
RON + 3 ml TEL/gal: 74.4
Paraffins, vol %: 55.2
Olefins, vol %: 0.9
Naphthenes, vol %: 39.0
Aromatics, vol %: 4.9

Heavy naphtha
Range, °F.: 300-380
Yield, vol %: 4.02
Gravity, °API: 53.3
Sulfur, ppm: 12.0
P/O/N/A, vol %: 67.6/1.7/22.6/8.1

Kerosine
Range, °F.: 380-450
Yield, vol %: 2.04
Gravity, °API: 48.6
Sulfur, ppm: 91.4
Smoke pt, mm: 34
Pour pt, °F.: −30
Aniline pt, °F.: 156.7
Aromatics (FIA), %: 8.4
Cetane no.: 46.5
Diesel index: 76.2

Gas oil
Range, °F.: 450-650
Yield, vol %: 11.99
Gravity, °API: 42.2
Sulfur, wt %: 0.04
Cetane number: 58.5
Pour pt, °F.: 15
Vis., cSt @ 100° F.: 2.74

Heavy gas oil
Range, °F.: 650-1,050
Yield, vol %: 40.06
Gravity, °F.: 34.7
Sulfur, wt %: 0.065
Con. carbon, wt %: 0.07
Total nitrogen, wt %: 0.15
Basic nitrogen, wt %: 0.009
V/Ni, ppm: 0.1/0.1
Pour pt, °F.: 115
Aromatics (FIA), %: 15.6
Vis., cSt @ 130° F.: 10.0

Residue
Range, °F.: 650+
Yield, vol %: 74.3
Gravity, °API: 27.6
Sulfur, wt %: 0.09
Con. carbon, wt %: 6.05
V/Ni, ppm: 0.1/2.3
Pour pt, °F.: >120
Total nitrogen, wt %: 0.25
Vis., cSt @ 130° F.: 123.7

Daqing, China (see Taching)

Duri (Sumatran Heavy), Sumatra, Indonesia

Port of Dumai, Sumatra

Crude
Gravity, °API: 21.1
Sulfur, wt %: 0.20
Vis., cSt @ 122° F.: 131.9
Pour pt, °F.: 54
C_4 & lighter, vol %: 0.02

Light naphtha
Range (TBP), °F.: C_5-200
Yield, vol %: 0.48
Gravity, °API: 70.7
Sulfur, wt %: 0.007
Paraffins, vol %: 66.1
Naphtha, vol %: 33.5
Aromatics, vol %: 0.4

Heavy naphtha
Range (TBP), °F.: 200-340
Yield, vol %: 3.2
Gravity, °API: 51.1
Sulfur, wt %: 0.009
P/N/A. vol %: 31/62/7

Kerosine
Range (TBP), °F.: 340-460
Yield, vol %: 6.0
Gravity, °API: 36.3
Sulfur, wt %: 0.039
Smoke pt, mm: 18
Freeze pt, °F.: −73

Gas oil
Range (TBP), °F.: 460-650
Yield, vol %: 14.7
Gravity, °API: 27.4
Sulfur, vol %: 0.136
Pour pt, °F.: −1
Diesel index: 37.9

Reduced crude
Range (TBP), °F.: 650+
Yield, vol %: 75.6
Gravity, °API: 17.6
Sulfur, wt %: 0.21
Pour pt, °F.: 86
Vis., cSt @ 122° F.: 1,134
Rams. carbon, wt %: 7.8
V/Ni/Fe, wt % ppm: 1/16/0

Handil, Kalimantan, Indonesia

SBM about 6 miles offshore 27 miles northeast of Balikpapan

Crude
Gravity, °API: 32.75
Sulfur, wt %: 0.079
Pour pt, +85 °F.
Rvp, psi: 1.6
Vis., cSt @ 37.8° C.: 4.2
Con. carbon, wt%: 1
V/Ni, ppm: <0.5/<1
C_4 & lighter, wt %: 0.5

Gasoline
Range, °C.: C_5—75
Yield, wt %: 2.2
Gravity, °API: 69.4
Sulfur, ppm: 5
Paraffins, vol %: 64
Naphthenes, vol %: 20.2
Aromatics, vol %: 15.8
RON, clear: 79.7
RON + 0.6 g TEL/l: 89.2

Naphtha
Range, °C.: 75-145
Yield, wt %: 11.4
Gravity, °API: 45.8
Sulfur, ppm: 9
P/N/A, vol %: 21.8/33.3/44.9

Kerosine
Range, °C.: 145-250
Yield, wt %: 19.3
Gravity, °API: 33.6
Sulfur, ppm: 136
Aromatics (FIA), vol %: 44.2
Smoke pt, mm: 9
Freezing pt, °C.: −49

Gas oil
Range, °C.: 145-350
Yield, wt %: 46.3
Gravity, °API: 31.6
Sulfur, wt %: 0.061
Vis., cSt @ 20° C.: 2.49
Aniline pt, °C.: 51.8
Pour pt, °C.: −7

Residue
Range, °C.: 350+
Yield, wt %: 39.6
Gravity, °API: 25.1
Sulfur, wt %: 0.13
Vis., cSt @ 50° C.: 46.7
Pour pt, °C.: +45
Con. carbon, wt %: 2.6
V/Ni, ppm: <1/<2

Jatibarang, Java, Indonesia

SBM terminal about 6.5 nautical miles off north coast of Java

Crude
Gravity, °API: 29.0
Vis., cSt @ 122° F.: 83.8
Pour pt, °F.: 110
Rvp @ 100° F., psi: 0.2
Sulfur content, wt %: 0.07
Wax content, wt %: 24.6
Con. carbon residue, wt %: 7.53
Charac. factor, K UOP: 12.5

Gasoline
Range, °C.: Ibp-100
Yield, vol %: 3.6
RON, clear: 70.0

Naphtha
Range, °C.: 100-175
Yield, vol %: 7.9
Paraffins, vol %: 46.0
Naphthenes, vol %: 43.0
Aromatics, vol %: 11.0

Kerosine
Range, °C.: 175-250
Yield, vol %: 7.0
Smoke pt, mm: 21.0

Gas oil
Range, °C.: 250-350
Yield, vol %: 13.1
Diesel index: 67.5

Residue
Range, °C.: 350+
Yield, vol %: 68.4
Sulfur, wt %: 11.0
Pour pt, °F.: 120

Labuan Blend, Sabah, Malaysia

SBM in South China Sea off Labuan Island terminal

Crude
Gravity, °API: 33.2
Vis., cSt @ 70° F.: 4.41
Pour pt, °F.: 52
Sulfur, ppm: 917
Neut. no., mg KOH/g: 0.30
Rvp, psi: 3.52
Con. carbon residue, wt %: 2.54
V/Ni, ppm: 0.015/<0.002
Wax content, wt %: 2.34
Asphaltene content, wt %: 0.22
C_5 & lighter, wt %: 1.3

Light naphtha
Range, °F.: C_5-145
Yield, vol %: 2.0
Sulfur, ppm: <5
Rvp, psi: 12.4

Heavy naphtha
Range, °F.: 145-330
Yield, vol %: 18.80
Sulfur, ppm: 20
RON, clear: 67.0
RON + 3 cc TEL/U.S. gal: 85.0
Paraffins, wt %: 17.52
Naphthenes, wt %: 74.58
Aromatics, wt %: 7.89

Kerosine
Range, °F.: 330-450
Yield, vol %: 18.00
Gravity, °API: 38.70
Sulfur, ppm: 140
Freezing pt, °F.: −81.4
Pour pt, °F.: <−17
Smoke pt, mm: 21
Cetane index: 34.39
Diesel index: 44

Distillate
Range, °F.: 450-650
Yield, vol %: 38.27
Gravity, °API: 29.27
Sulfur, wt %: 0.07
Cloud pt, °F.: 19.4
Cetane index: 40.09
Diesel index: 38
Aniline pt, °C.: 55
Con. carbon residue, wt %: nil
Vis., cSt @ 70° F.: 6.43

Residue
Range, °F.: 650+
Yield, vol %: 21.96
Sulfur, wt %: 0.15
Nitrogen, ppm: 531
Pour pt, °F.: 89.6
Con. carbon residue, wt %: 1.62
V/Ni, ppm: 0.03/0.08
Vis., cSt @ 100° F.: 125.8

Heavy gas oil
Range, °F.: 680-975
Yield, vol %: 16.83
Gravity, °API: 15.79
Sulfur, wt %: 0.14
Total nitrogen, ppm: 586
Basic nitrogen, ppm: 144
Pour pt, °F.: 98
Con. carbon residue, wt %: 0.30
Vis., cSt @ 100° F.: 173.61

Note: Labuan Blend comes from offshore fields connected to North Sabah Trunk Line. They include Samarang and South Furious. Erb West, St. Joseph and Barton were to be added during late 1983.

Minas (Sumatran Light), Sumatra, Indonesia

Port of Dumai, Sumatra

Crude
Gravity, °API: 34.5
Sulfur, wt %: 0.081
Vis., cSt @ 122° F.: 12.4
Pour pt, °F.: 97
C_4 & lighter, vol %: 0.27

Light naphtha
Range (TBP), °F.: C_5-200
Yield, vol %: 2.83
Gravity, °API: 80.0
Sulfur, wt %: 0.001
Paraffins, vol %: 75
Naphtha, vol %: 25
Aromatics, vol %: nil

Heavy naphtha
Range (TBP), °F.: 200-340
Yield, vol %: 9.4
Gravity, °API: 60.2
Sulfur, wt %: 0.002
P/N/A, vol %: 62/30/8

Kerosine
Range (TBP), °F.: 340-460
Yield, vol %: 10.5
Gravity, °API: 47.2
Sulfur, wt %: 0.015
Smoke pt, mm: 35
Freeze pt, °F.: −34

Gas oil
Range (TBP), °F.: 460-650
Yield, vol %: 20.2
Gravity, °API: 39.6
Sulfur, vol %: 0.061
Pour pt, °F.: 44
Diesel index: 72

Reduced crude
Range (TBP), °F.: 650+
Yield, vol %: 56.8
Gravity, °API: 26.5
Sulfur, wt %: 0.15
Pour pt, °F.: 106
Vis., cSt @ 122° F.: 101.2
Rams. carbon, wt %: 5.1
V/Ni/Fe, wt % ppm: 1/15/10

Miri Light, Sarawak, Malaysia

SBMs off Miri terminal

Crude
Gravity, °API: 36.27
Vis., cSt @ 70° F.: 3.65
Pour pt, °F.: 34
Sulfur, ppm: 825
Total nitrogen, wt %: 0.0137
Neut. no., mg KOH/g: 0.175
Rvp, psi: 4.7
Con. carbon residue, wt %: 2.94
V/Ni, ppm: 0.012/<0.002
Wax content, wt %: 2.83
Asphaltene content, wt %: 0.258
C_5 & lighter, wt %: 2.2

Light naphtha
Range, °F.: C_5-145
Yield, vol %: 1.60
Sulfur, ppm: <5
Rvp, psi: 10.5

Heavy naphtha
Range, °F.: 145-330
Yield, vol %: 23.10
Sulfur, ppm: 17
RON, clear: 66.5
RON + 3 cc TEL/U.S. gal: 84.5
Paraffins, wt %: 14.55
Naphthenes, wt %: 68.94
Aromatics, wt %: 16.51

Kerosine
Range, °F.: 330-450
Yield, vol %: 15.80
Sulfur, ppm: 125
Freezing pt, °F.: < −70
Gravity, °API: 40.65
Smoke pt, mm: 21
Cetane index: 35.3
Diesel index: 47

Light distillate
Range, °F.: 450-650
Yield, vol %: 33.09
Gravity, °API: 30.99
Sulfur, ppm: 600
Cetane index: 41.1
Diesel index: 43
Aniline pt, °C.: 60
Vis., cSt @ 70° F.: 6.23

Residue
Range, °F.: 650+
Yield, vol %: 25.26
Gravity, °API: 21.01
Sulfur, wt %: 0.17
Pour pt, °F.: 100.4
Con. carbon residue, wt %: 2.22
V/Ni, ppm: 0.030/<0.001
Vis., cSt @ 100° F.: 217.26

Heavy gas oil
Range, °F.: 680-975
Yield, vol %: 20.26
Gravity, °API: 20.71
Sulfur, ppm: 0.15
Total nitrogen, ppm: 584
Basic nitrogen, ppm: 95
Pour pt, °F.: 35
Vis., cSt @ 100° F.: 103.85

Note: Miri is blend of 7 offshore fields. Miri Land crude no longer produced.

Pulai, Malaysia

Piped ashore to terminal north of Chukai, Kuala Trengganu area, peninsular Malaysia, as part of Tapis Blend.

Crude
Gravity, °API: 42.52
Vis., cSt @ 70° F.: 2.12
Pour pt, °F.: 23
Sulfur, ppm: 160
Total nitrogen, ppm: 33.5
Rvp, psi: 2.7
Con. carbon residue, wt %: 0.11
V/Ni, ppm: 1.4/0.1
Wax content, wt %: 3.11
Asphaltene content, wt %: 0.31
C_4 & lighter, vol %: 0.45

Light naphtha
Range, °F.: C_5-145
Yield, vol %: 2.03
Sulfur, ppm: <5

Heavy naphtha
Range, °F.: 145-330
Yield, vol %: 27.93
Sulfur, ppm: <5
RON, clear: <70
Paraffins, wt %: 31.83
Naphthenes, wt %: 26.44
Aromatics, wt %: 31.38

Kerosine
Range, °F.: 330-450
Yield, vol %: 27.85
Sulfur, ppm: 19
Freezing pt, °F.: −67
Pour pt, °F.: −66
Smoke pt, mm: 21
Cetane index: 43.17
Diesel index: 56.62
Vis., cSt @ 70° F.: 1.71

Light distillate
Range, °F.: 450-650
Yield, vol %: 34.14
Gravity, °API: 34.8
Sulfur, ppm: 270
Cloud pt, °F.: +14
Cetane index: 48.63
Diesel index: 54.04
Aniline pt, °C.: 68.5
Vis., cSt @ 70° F.: 5.01

Residue
Range, °F.: 650+
Yield, vol %: 7.60
Gravity, °API: 28.20
Sulfur, ppm: 800
Nitrogen, ppm: 323
Pour pt, °F.: 102
Aniline pt, °C.: 91
Con. carbon residue, wt %: 1.58
V/Ni, ppm: <0.01/<0.01
Vis., cSt @ 130° F.: 17.53
Note: Pulai is contributor to Tapis Blend

Salawati, West Irian, Indonesia

Salawati marine terminal (breasting and mooring dolphins and storage barge) on Sele Strait

Crude
Gravity, °API: 38.0
Vis., cSt @ 100° F.: 4.2
Pour pt, °F.: −15
Rvp @ 100° F., psi: 0.6
Sulfur, wt %: 0.49
Wax content, wt %: 8.42
Con. carbon residue, wt %: 1.3
Charac. factor K UOP: 12.0

Gasoline
Range, °C.: C_5-94
Yield, vol %: 1.0

Naphtha
Range, °C.: 94-149
Yield, vol %: 10.7
Paraffins, vol %: 71.4
Naphthenes, vol %: 27.9
Aromatics, vol %: 0.8

Kerosine
Range, °C.: 149-260
Yield, vol %: 35.4
Smoke pt, mm: 35.5
Freezing pt, °F.: −28

Gas oil
Range, °C.: 260-344
Yield, vol %: 21.5
Cetane index: 58.6

Residue
Range, °C.: 344+
Yield, vol %: 31.4
Sulfur, wt %: 1.1
Pour pt, °F.: 115

Sanga Sanga, Kalimantan, Indonesia

Crude
Gravity, °API: 25.7
Rvp, psi @ 100° F.: 0.8
Sulfur, wt %: 0.17
Pour pt, °F.: +5
V/Ni, ppm: nil/0.9
Vis., SUS @ 100° F.: 151.3
Con. carbon residue, wt %: 0.79

Naphtha
Range, °F.: Ibp-350
Yield, vol %: 13.2
Rvp, psi @ 100° F.: 2.7
Sulfur, wt %: 0.015

Kerosine
Range, °F.: 350-450
Yield, vol %: 12.4
Aniline pt, °C.: 118
Sulfur, wt %: 0.04
Smoke pt, mm: 16

Diesel
Range, °F.: 450-650
Yield, vol %: 41.6
Gravity, °API: 25.3
Aniline pt, °C.: 133
Cetane index (calc.): 36.5
Sulfur, wt %: 0.13
Pour pt, °F.: +25
Vis., SUS @ 100° F.: 41.6

Fuel oil
Range, °F.: 650+
Yield, vol %: 32.8
Gravity, °API: 19.3
Sulfur, wt %: 0.31
Pour pt, °F.: +105
V/Ni, ppm: Nil/1.4

Sepinggan-Yakin Mixed (4:1), East Kalimantan, Indonesia

Lawi-Lawi terminal about 12 miles south of Balikpapan/ SBM about 6 miles offshore in Makasar Straits

Crude
Gravity, °API: 31.7
Vis., cSt @ 100° F.: 3.16
Pour pt, °F.: 20
Rvp, psi @ 100° F.: 2.6
Total acid no., mg KOH/g: 0.3
Sulfur content, wt %: 0.11
Con. carbon residue, wt %: 0.54

Gasoline
Range, °C.: C_5-100
Yield, vol %: 1.5

Naphtha
Range, °C.: 100-175
Yield, vol %: 19.5

Kerosine
Range, °C.: 175-250
Yield, vol %: 21.5

Gas oil
Range, °C.: 250-350
Yield, vol %: 35.5

Fuel oil
Range, °C.: 350+
Yield, vol %: 22.0

Seria Light, Brunei

Lutong terminal

Crude
Gravity, °API: 36.2
Rvp, psi: 6.0
Sulfur, wt %: 0.07
Pour pt, °F.: 35
Vis., SSU @ 80° F.: 36.5
Yield, Ibp-113° F., vol %: 5.77

Gasoline
Range, °F.: 113-220
Yield, vol %: 10.23
RON + 3 cc TEL/gal: 85.0

Naphtha
Range, °F.: 220-390
Yield, vol %: 21.41
Paraffins, vol %: 35.9
Naphthenes, vol %: 34.6
Dinaphthenes, vol %: 11.8
Aromatics, vol %: 17.7

Light distillate
Range, °F.: 390-550
Yield, vol %: 26.63
Gravity, °API: 33.0
Cetane index: 35.0
Sulfur, wt %: 0.04
Aniline pt, °F.: 129.5
Pour pt, °F.: −35
Range, °F.: 550-650
Yield, vol %: 13.88
Gravity, °API: 29.0

Light gas oil
Range, °F.: 450-650
Yield, vol %: 31.74
Gravity, °API: 30.1
Cetane index: 40.7
Sulfur, wt %: 0.07

Heavy gas oil
Range, °F.: 650-971
Yield, vol %: 18.89
Gravity, °API: 18.0
Sulfur, wt %: 0.15
Total nitrogen, ppm: 513
Basic nitrogen, ppm: 262
Pour pt, °F.: 95
Carbon residue, wt %: 0.18

Vacuum flashed residue
Range, °F.: 971+
Yield, vol %: 3.19
Gravity, °API: 10.0
Sulfur, wt %: 0.32

Shengli, China

Qingdao terminal on Yellow Sea

Crude
Gravity, °API: 24.2
Rvp, psi: 0
Sulfur, wt %: 1.00
Pour pt, °F.: +70
Vis., SFS @ 122° F.: 48.3
Acid no.: 1.16

Light ends
Range, °F.: Ibp-160
Yield, vol %: 2.0

Light naphtha
Range, °F.: 160-290
Yield, vol %: 3.3
Paraffins, vol %: 45.9
Naphthenes, vol %: 44.7
Aromatics, vol %: 9.4

Heavy naphtha
Range, °F.: 290-390
Yield, vol %: 3.7
Gravity, °API: 47.5
Sulfur, wt %: 0.05
P/N/A, vol %: 48.9/30.9/20.2

Kerosine
Range, °F.: 390-500
Yield, vol %: 6.2
Gravity, °API: 39.9
Sulfur, wt %: 0.23
Olefins, vol %: 0.9
Aromatics, vol %: 16.5
Smoke pt, mm: 17
Freeze pt, °F.: −29.2

Diesel
Range, °F.: 500-660
Yield, vol %: 12.3
Gravity, °API: 34.7
Sulfur, wt %: 0.53
Pour pt, °F.: +40
Cetane index: 52.6
Cloud pt, °F.: +42

Light gas oil
Range, °F.: 660-780
Yield, vol %: 9.7
Gravity, °API: 31.4
Sulfur, wt %: 0.65
Vis., SSU @ 100° F.: 76.0
Pour pt, °F.: +80
Aniline pt, °F.: 183.0
UOP K factor: 12.1
Carbon residue, wt %: 0.06

Heavy gas oil
Range, °F.: 780-1,050
Yield, vol %: 26.4
Gravity, °API: 24.8
Sulfur, wt %: 0.79
Vis., SSU @ 210° F.: 78.3
Pour pt, °F.: +110
Aniline pt, °F.: 202.0
Carbon residue, wt %: 0.28

Bottoms
Range, °F.: 1,050+
Yield, vol %: 36.4
Gravity, °API: 11.7
Sulfur, wt %: 1.66
Vis., SSF @ 210° F.: 1,097.8
Carbon residue, wt %: 16.4

Soviet Export Blend, U.S.S.R.

Terminals: Ventspils, Baltic and Novorossysk, Black Sea

Crude
Gravity, °API: 32.5
Sulfur, wt %: 1.38
Rvp, kPa: 49.2
Pour pt, °C: −23
Vis. @ 20° C.: 11.5

Light naphtha
Range (TBP), °C.: Ibp-90
Yield, wt %: 10.3
Density @ 15° C., g/ml: 0.676
Sulfur, wt %: 0.005
Paraffins, wt %: 71.7
Naphthenes, wt %: 26.5
Aromatics, wt %: 1.8

Heavy naphtha
Range (TBP), °C.: 90-180
Yield, wt %: 11.3
Density @ 15 °C., g/ml: 0.761
Sulfur, wt %: 0.029
P/N/A, vol %: 38.5/52.0/9.5

Kerosine
Range (TBP), °C.: 180-220
Yield, wt %: 6.5
Density @ 15 °C., g/ml: 0.806
Sulfur, wt %: 0.15
Aromatics, vol %: 20.1
Freeze pt, °C.: −57
Smoke pt, mm: 25
Aniline pt, °C.: 62.5
Vis., cSt @ 20° C.: 1.73

Light gas oil
Range (TBP), °C.: 180-350
Yield, wt %: 24.3
Density @ 15° C., g/ml: 0.840
Cetane index (calc.): 49.5
Sulfur, wt %: 0.57
Pour pt, °C.: −29
Aniline pt, °C.: 67.5
Vis., cSt @ 20° C.: 3.69

Heavy gas oil
Range (TBP), °C.: 350-515
Yield, wt %: 29.4
Density @ 15° C., g/ml: 0.915
Sulfur, wt %: 1.9
Vis., cSt @ 50° C.: 26.0
V/Ni, ppm: 0.15/0.17

Long residuum
Range, °C.: 350
Yield, wt %: 54.1
Density @ 15° C., g/ml: 0.952
Sulfur, wt %: 2.59
Rams. carbon, wt %: 8.2
Vis., cSt @ 50° C.: 191

Short residuum
Range, °C.: 515
Yield, wt %: 26.4
Sulfur, wt %: 2.98
Rams. carbon, wt %: 16.4
Vis. @ 60° C.: 3.9
V/Ni, ppm: 154/53

Note: Crude on which this assay was based was shipped from Ventspils. It is claimed that crude from either port is of similar quality.

Taching (Daqing), China

Luda (Darien) terminal on Yellow Sea

Crude
Gravity, °API: 33.0
Sulfur, wt%: .078
Pour pt, °F.: +95

Light ends
Range, °F.: Ibp-160
Yield, vol %: 1.8

Light naphtha
Range, °F.: 160-290
Yield, vol %: 5.4
Sulfur, wt %: 0.0130
Paraffins, vol %: 46.6
Olefins, vol %: 0.4
Naphthenes, vol %: 50.4
Aromatics, vol %: 2.6

Heavy naphtha
Range, °F.: 290-390
Yield, vol %: 5.8

Sulfur, wt %: 0.010
P/O/N/A, vol %: 39.6/1.5/52.4/6.5

Kerosine
Range, °F.: 390-500
Yield, vol %: 7.7
Gravity, °API: 44.0
Sulfur, wt %: 0.0127
Olefins, vol %: 3.2
Aromatics, vol %: 11.1
Smoke pt, mm: 22
Freezing pt, °F.: −13.9

Diesel
Range, °F.: 500-635
Yield, vol %: 7.2
Gravity, °API: 39.2
Sulfur, wt %: 0.0390
Vis., SSU @ 100° F.: 40.2
Pour pt, °F.: +40
Aniline pt, °F.: 178.0
Diesel index: 69.8

Light gas oil
Range, °F.: 635-775
Yield, vol %: 16.3
Gravity, °API: 37.0
Sulfur, wt %: 0.0480
Vis., SSU @ 100° F.: 52.1
Pour pt, °F.: +80
Carbon resiude, wt %: 0.01

Heavy gas oil
Range, °F.: 775-932
Yield, vol %: 18.9
Gravity, °API: 31.4
Sulfur, wt %: 0.1140
Vis., SSU @ 210° F.: 48.1
Pour pt, °F.: +115
UOP K factor: 12.5
Carbon resiude, wt%: 0.03

Bottoms
Range, °F.: 932+
Yield, vol %: 36.9
Gravity, °API: 21.2
Sulfur, wt %: 0.14
Vis., SSF @ 210° F.: 52.2
Carbon residue, wt %: 7.3
V/Ni, ppm: 1.0/0

Tapis, Malaysia

Piped ashore to terminal north of Chukai, Kuala Trengganu area, peninsular Malaysia, as part of Tapis Blend

Crude
Gravity, °API: 44.30
Vis., cSt @ 70° F.: 2.69
Pour pt, °F.: 39
Sulfur, ppm: 230
Total nitrogen, ppm: 134
Basic nitrogen, ppm: 10.1
Neut. no., mg KOH/g: 0.04
Rvp, psi: 2.5
Con. carbon residue, wt %: 2.17
V/Ni, ppm: <0.002/0.17
Wax content, wt %: 5.75
Asphaltene content, wt %: 0.112
Yield, C_4 & lighter, vol %: 0.97

Light gasoline
Range, °F.: C_5-145
Yield, vol %: 2.97
Sulfur, ppm: <5
Rvp, psi: 10.4
RON, clear: 74
RON + 3 cc TEL/U.S. gal: 92.5
Paraffins, wt %: 84.15
Naphthenes, wt %: 13.22
Aromatics, wt %: 2.63

Heavy naphtha
Range, °F.: 145-330
Yield, vol %: 23.47
Sulfur, ppm: 13
RON, clear: 53
P/N/A, wt %: 40.26/31.08/28.66

Kerosine
Range, °F.: 330-450
Yield, vol %: 20.70
Sulfur, ppm: 23
Freezing pt, °F.: −40
Smoke pt, mm: 20
Cetane index: 55.87
Diesel index: 74

Light distillate
Range, °F.: 450-650
Yield, vol %: 34.27
Gravity, °API: 41.0
Sulfur, ppm: 135
Cetane index: 61.9
Aniline pt, °C.: 79.5
Vis., SUS @ 70° F.: 41.35

Residue
Range, °F.: 650+
Yield, vol %: 17.62
Gravity, °API: 29.58
Sulfur, ppm: 700
Pour pt, °F.: 108
Con. carbon residue, wt %: 2.024
V/Ni, ppm: 0.31/0.01
Vis., SUS @ 130° F.: 102.31

Note: Tapis is contributor to Tapis Blend

Tapis Blend, Malaysia

Piped ashore to terminal north of Chukar, Kuala Trengganu area, peninsular Malaysia

Tapis Blend comprises oil from six fields in the South China Sea. They are Tapis, Pulai, Bekok, Tiong, Tingge, and Kepong. The latter three fields only recently began contributing to blend and assays had not yet been run at mid 1983. Tapis crude originally made up 60% of blend, Pulai and Bekok 40%. Assays are presented for these three crudes.

Tembungo, Sabah, Malaysia

Production platform in offshore producing area

Crude
Gravity, °API: 37.4
Sulfur, wt %: 0.04
Pour pt, °F.: +25
Vis., cSt @ 100° F.: 2.0
Rvp, psi: 2.8
Salt content, lb/1,000 bbl: 2.3

Light naphtha
Range, °F.: C_5-160
Yield, vol %: 2.4
Gravity, °API: 81.0
Sulfur, wt %: 0.001
Rvp, psi: 12.6
Paraffins, vol %: 83.0
Naphthenes, vol %: 17.0
Aromatics, vol %: Nil

Heavy naphtha
Range, °F.: 160-300
Yield, vol %: 17.9
Gravity, °API: 53.0
Sulfur, wt %: 0.004
Paraffins, vol %: 27.0
Naphthenes, vol %: 59.0
Aromatics, vol %: 14.0

Light distillate
Range, °F.: 300-510
Yield, vol %: 35.7
Gravity, °API: 36.0
Sulfur, wt %: 0.04
Freeze point, °F.: −45 est.
Smoke pt, mm: 13.0
Paraffins, vol %: 30.0
Naphthenes, vol %: 36.0
Aromatics, vol %: 34.0

Heavy distillates
Range, °F.: 510-650
Yield, vol %: 28.9
Gravity, °API: 33.0
Sulfur, wt %: 0.06
Pour pt, °F.: +15.0
Aniline pt, °F.: 153.0
Diesel index: 50.5

Resid
Range, °F.: 650+
Yield, vol %: 13.5
Gravity, °API: 25.0
Sulfur, wt %: 0.14
Pour pt, °F.: 85.0
Vis., cSt @ 100° F.: 42.0
Con. carbon, wt %: 0.55

Udang, Natuna Sea, Indonesia

Storage vessel with SBM about 43 nautical miles north of Anambas Island

Crude
Gravity, °API: 38.0
Kin. vis. @ 130° F.: 8.71
Con. carbon residue, wt %: 3.0
Sulfur, wt %: 0.05
V/Ni, ppm: 0.9/3.5
Pour pt, °C.: +37.8
Rvp, psi: nil
C_4 & lighter, vol %: 0.36

Naphtha
Range (TBP), °F.: 90-375
Yield, vol %: 15.2
Gravity, °API: 63.3
Paraffins, vol %: 75.5
Naphthenes, vol %: 20.3
Sulfur, wt %: <0.005

Kerosine
Range, °F.: 375-520
Yield, vol %: 11.4
Gravity, °API: 47.7
Sulfur, wt %: 0.005
Aromatics, vol %: 6

Heavy distillate
Range, °F.: 520-700
Yield, vol %: 18.7
Gravity, °API: 41.6
Sulfur, wt %: 0.02

Gas oil
Range, °F.: 700-1,010
Yield, vol %: 34.6
Gravity, °API: 35.4
Sulfur, wt %: 0.04

Residue
Range, °F.: 1,010+
Yield, vol %: 19.7
Gravity, °API: 20.9
Sulfur, wt %: 0.10
Kin. vis. @ 210° F.: 150
Con. carbon residue, wt %: 12.2
V/Ni, ppm: 4/16

Wallo, West Irian, Indonesia

Kasim marine terminal (CBM) between island of Jef Kasim and mainland Irian Jaya

Crude
Gravity, °API: 34.05
Vis., cSt @ 100° F.: 5.0
Rvp @ 100° C., psi: 3.7
Acid no., mg KOH/g: 0.30
Con. carbon residue, wt %: 2.18
Charac. factor K UOP: 11.7

Gasoline
Range, °C.: C_5-95
Yield, vol %: 4.5

Naphtha
Range, °C.: 95-185
Yield, vol %: 19.0
Paraffins, vol %: 63.3
Naphthenes, vol %: 30.7
Aromatics, vol %: 6.0

Kerosine
Range, °C.: 185-260
Yield, vol %: 16.7
Smoke pt, mm: 22.0
Freezing pt, °C.: −46

Gas oil
Range, °C.: 260-350
Yield, vol %: 20.0
Diesel index: 56.1

Fuel oil
Range, °C.: 350+
Yield, vol %: 39.8
Sulfur, wt %: 1.36
Pour pt, °F.: 100

Latin America

BCF 24, Venezuela

La Salina, Lake Maracaibo

Crude
Gravity, °API: 23.5
Sulfur, wt %: 1.85
Vis., SUS @ 100° F.: 192.2
Pour pt, °F.: −60
Yield, 0°(IVT) - −82° F., vol %: 1.53

Light naphtha
Range, °F.: 82-200
Yield, vol %: 3.80
Sulfur, wt %: 0.0011
Paraffins, %: 71.37
Naphthenes, %: 26.70
Aromatics, %: 1.93

Heavy naphtha
Range, °F.: 200-300
Yield, vol %: 5.0
Sp gr: 0.7565
Sulfur, wt %: 0.0066
P/N/A, %: 48.24/39.87/11.89
RON clear: 65.4

Naphtha
Range, °F.: 300-350
Yield, vol %: 2.82
P/N/A, %: 41.95/42.21/15.84

Kerosine
Range, °F.: 350-400
Yield, vol %: 3.14
P/N/A, %: 37.59/44.45/17.95
Sulfur, wt %: 0.1186
Freeze pt, °F.: −91.39
Smoke pt, mm: 22.25
Cetane no.: 46.06
Aniline pt, °F.: 128.05

Gas oil
Range, °F.: 400-500
Yield, vol %: 7.53
Gravity, °API: 37.37
Sulfur, wt %: 0.3027
Kin. vis. @ 122° F.: 1.51
Freeze pt, °F.: −63.27
Smoke pt, mm: 19.33
Aniline pt, °F: 136.44
Cetane no.: 42.20

Gas oil
Range, °F.: 500-550
Yield, vol %: 4.55

Gas oil
Range, °F.: 550-650
Yield, vol %: 9.73
Sulfur, wt %: 1.06
Gravity, °API: 29.07
Kin. vis. @ 122° F.: 4.62
Pour pt, °F.: 4.13
Smoke pt, mm: 7.22
Aniline pt, °F.: 150.73

Residue
Range, °F.: 650+
Yield, vol %: 61.91
Gravity, °API: 13.26
Sulfur, wt %: 2.58
Kin. vis. @ 122° F.: 2,295
Ni/V, ppm: 40/347

Bachaquero, Venezuela

La Salina, Lake Maracaibo

Crude
Gravity, °API: 16.8
Sulfur, wt %: 2.4
Vis., SUS @ 100° F.: 1,362
Pour pt, °F.: −10
Rvp, psi: 1.6
Yield, 0° (IVT) - −82° F., vol %: 0.80

Light naphtha
Range, °F.: 82-200
Yield, vol %: 2.44
Sulfur, wt %: 0.0075
Paraffins, %: 66.17
Naphthenes, %: 31.28
Aromatics, %: 2.55
RON clear: 71.7

Heavy naphtha
Range, °F.: 200-300
Yield, vol %: 3.54
Sulfur, wt %: 0.026
P/N/A, wt %: 29.38/58.96/11.66
RON clear: 66.7

Naphtha
Range, °F. 300-350
Yield, vol %: 1.81
Sp gr: 0.8018
Sulfur, wt %: 0.1107
P/N/A, %: 23.20/59.59/17.21

Kerosine
Range, °F.:350-400
Yield, vol %: 2.11
Sp gr: 0.8227
Sulfur, wt %: 0.19
P/N/A, %: 25.12/54.49/20.39
Freeze pt, °F.: −74.12
Smoke pt, mm: 17.75
Cetane no.: 48.56

Gas oil
Range, °F.: 400-500
Yield, vol %: 6.37
Gravity, °API: 35.43
Sulfur, wt %: 0.52
Aromatics, wt %: 25.29
Freeze pt, °F.: −66.62
Smoke pt, mm: 9.23
Cetane no.: 46.36
Aniline pt., °F.: 127.39
Cetane index: 39.98

Gas oil
Range, °F.: 500-550
Yield, vol %: 3.93

Gas oil
Range, °F.: 550-650
Yield, vol %: 8.95
Sulfur, wt %: 1.36
Pour pt, °F.: −47.99
Smoke pt, mm: 2.83
Aniline pt, °F.: 138.64

Residue
Range, °F.: 650+
Yield, vol %: 70.24
Gravity, °API: 9.39
Sulfur, wt %: 3.0
Kin. vis. @ 122° F.: 8,672
Ni/V, ppm: 74/435

Boscan, Venezuela

Bajo Grande, Lake Maracaibo

Crude
Gravity, °API: 10.10
Sulfur, wt %: 5.5
Vis. SUS @ 100° F.: 90,000
Pour pt, °F.: +50

Light naphtha
Range, °F.: 82-200
Yield, vol %: 0.55

Heavy naphtha
Range, °F.: 200-300
Yield, vol %: 1.32
Sulfur, wt %: 0.68
Paraffins, %: 53.28

Naphtha
Range, °F.: 300-350
Yield, vol %: 0.88
Sulfur, wt %: 1.28
Paraffins, %: 34.9

Kerosine
Range, °F.: 350-400
Yield, vol %: 1.28
Sulfur, wt %: 1.88
Aromatics, %: 24.04
Pour pt, °F.: −141.0
Smoke pt, mm: 16.0
Aniline pt, °F.: 112.69

Gas oil
Range, °F.: 400-500
Yield, vol %: 3.96
Gravity, °API: 34.0
Sulfur, wt %: 3.14
Kin. vis. @ 122° F.: 1.81
Pour pt, °F.: −77.53
Smoke pt, °F.: 16.11

Aniline pt, °F.: 113.83
Cetane index: 37.24

Gas oil
Range, °F.: 500-550
Yield, vol %: 2.66
Gravity, °API: 28.62
Sulfur, wt %: 4.02

Gas oil
Range, °F.: 550-650
Yield, vol %: 6.46
Gravity, °API: 25.54
Sulfur, wt %: 4.47
Pour pt, °F.: −10.9
Cetane no.: 38.0
Aniline pt, °F.: 117.3
Cetane index: 42.27

Residue
Range, °F.: 650+
Yield, vol %: 82.9
Sulfur, wt %: 5.86
Gravity, °API: 6.10
Sulfur, wt %: 5.86
Ni/V, ppm: 175/1,407
Kin. vis. @ 122° F.: 22,502

Ceuta, Venezuela

Puerto Miranda, Lake Maracaibo

Crude
Gravity, °API: 31.8
Sulfur, wt %: 1.2
Vis., SUS @ 100° F.: 62
Pour pt, °F.: −35
Rvp: 2.7
Yield, 0°(IVT) - −82° F., vol %: 2.10

Light naphtha
Range, °F.: 82-200
Yield, vol %: 7.51
Sulfur, wt %: 0.002
Paraffins, %: 75.69
Naphthenes, %: 19.85
Aromatics, %: 4.46
RON clear: 71.5

Heavy naphtha
Range, °F.: 200-300
Yield, vol %: 9.89
Sulfur, wt %: 0.01
P/N/A, %: 50.88/32.07/17.05
RON clear: 60.9

Naphtha
Range, °F.: 300-350
Yield, vol %: 5.36
P/N/A, %: 42.25/38.78/18.98

Kerosine
Range, °F.: 350-400
Yield, vol %: 5.28
Gravity, °API: 44.1
Sulfur, wt %: 0.054
P/N/A, %: 39.8/41.1/19.0
Smoke pt, mm: 21.39
Aniline pt, °F.: 122.8
Cetane index: 40.9

Gas oil
Range, °F.: 400-500
Yield, vol %: 9.93
Gravity, °API: 38.75
Sulfur, wt %: 0.23
Aromatics, %: 19.10
Smoke pt, mm: 19.59
Aniline pt, °F.: 136.18
Cetane index: 41.84

Gas oil
Range, °F.: 500-550
Yield, vol %: 5.0
Gravity, °API: 34.64
Sulfur, wt %: 0.72

Gas oil
Range, °F.: 550-650
Yield, vol %: 9.24
Gravity, °API: 30.17
Sulfur, wt %: 1.0
Aniline pt, °F.: 155.8
Cetane index: 48.03

Residue
Range, °F.: 650+
Yield, vol %: 45.69
Gravity, °API: 16.60
Sulfur, wt %: 2.05
Ni/V, ppm: 54/281

Galeota Mix (Trinidad Blend), Trinidad Tobago

Point Galeota SBM

Crude
Gravity, °API: 32.8
Sulfur, wt %: 0.27
Rvp, psi: 2.0
Pour pt, °F.: −5
Neut. no., mg KOH/g: 0.84
Rams. carbon, wt %: 0.5
Kin. vis., cSt @ 100° F.: 4.32
V/Ni, ppm: 0/1
Yield C_4 & lighter, vol %: 0.6

Naphtha
Range, °F.: C_5-200
Yield, vol %: 3.7
Sulfur, wt %: 0.010
Paraffins, vol %: 63.1
Naphthenes, vol %: 30.5
Aromatics, vol %: 6.4
RON clear: 73.1

Heavy naphtha
Range, °F.: 200-320
Yield, vol %: 8.7
Sulfur, wt %: 0.017
P/N/A, vol %: 39.4/44.9/15.7
RON clear: 63.8

Kerosine
Range, °F.: 320-520
Yield, vol %: 28.8
Gravity, °API: 36.6
Sulfur, wt %: 0.054
Aniline pt, °F.: 126.7
Diesel index: 46.3
Cetane index: 35.6
Freeze pt, °F.: −56
Smoke pt, mm: 20

Gas oil
Range, °F.: 520-650
Yield, vol %: 25.6
Gravity, °API: 30.3
Sulfur, wt %: 0.223
Aniline pt, °F.: 151.0
Diesel index: 45.8
Cetane index: 44.6
Pour pt, °F.: 11

Gas oil
Range, °F.: 650-850
Yield, vol %: 20.1
Gravity, °API: 26.6
Sulfur, wt %: 0.454
Nitrogen, wt %: 0.030
Vis., SUS @ 122° F.: 77.8

Residue
Range, °F.: 650+
Yield, vol %: 32.8
Gravity, °API: 24.2
Sulfur, wt %: 0.607
Pour pt, °F.: +65
Nitrogen, wt %: 0.086
Rams. carbon, wt %: 1.35
Vis., SUS @ 122° F.: 200.3
V/Ni, ppm: 1/1

Isthmus, Mexico

Pajaritos, Veracruz, and Salina Cruz (Pacific), Oaxaca

Crude
Gravity, °API @ 60° F.: 32.8
Sulfur, wt %: 1.51
Pour test, °F.: −15
Vis., SUS @ 70° F.: 65.53
Vis., SUS @ 100° F.: 43.91
Rvp, psi @ 100° F.: 6.4
Hydrogen sulfide, ppm: 102
NC_4 & lighter, wt %: 1.2

Light straight run
Range, °F.: 60-200
Yield, vol %: 9.1
Total sulfur, wt %: 0.046
RON clear: 62.6
RON + 3 ml TEL/gal: 82.4

Naphtha
Range, °F.: 60-400
Yield, vol %: 29.9
Paraffins, vol %: 64.40
Naphthenes, vol %: 21.02
Aromatics, vol %: 14.58
Total sulfur, wt %: 0.054
RON clear: 44.5
RON + 3 ml TEL/gal: 67.0

Kerosine
Range, °F.: 400-500
Yield, vol %: 12.5
Gravity, °API: 41.2
Freezing point, °F.: −36
P/N/A, vol %: 47.4/30.9/21.7
Total sulfur, wt %: 0.23
Aniline pt, °F.: 143.2
Smoke pt, mm: 22

Light gas oil
Range, °F.: 500-650
Yield, vol %: 16.0
Gravity, °API: 32.3
Pour pt, °F.: +25
P/N/A, vol %: 41.2/33.3/25.5
Total sulfur, wt %: 1.19
Carbon residue, Rams., wt %: 0.01
Aniline pt, °F.: 156.3
Cetane index: 52.5

Topped crude
Range, °F.: 650+
Yield, vol %: 40.4
Gravity, °API: 15.5
Vis., SUS @ 210° F.: 145.47
Vis., SUS @ 122° F.: 149.53
Pour pt, °F.: +55
Total sulfur, wt %: 2.94
Carbon residue, Rams., wt %: 8.08
Nitrogen, %: 0.2065
Ni/V, ppm: 14.8/67.1

Vacuum gas oil
Range, °F.: 650-1,100+
Yield, vol % (of crude): 28.5
Gravity, °API: 19.7
Aniline pt, °F.: 181.1
Vis., SUS @ 130° F.: 207.09
Pour pt °F.: +110
Sulfur, wt %: 2.45
Carbon residue, Rams., wt %: 0.97
Ni/V, ppm: 4.3/-

Vacuum residue
Range, °F.: 1,100+
Yield, vol % (of crude): 11.9
Gravity, °API: 4.2
Vis., SFS @ 275° F.: 235.8
Sulfur, wt %: 4.18
Carbon residue, wt %: 23.08
Ni/V, ppm: 37/210

Lagomedio, Venezuela

Punta Palmas, Puerto Miranda/La Salina, Lake Maracaibo

Crude
Gravity, °API: 31.50
Sulfur, wt %: 1.17
Vis., SUS @ 100° F.: 56
Pour pt, °F.: −15
Rvp: 5.3
Yield, 0°(IVT) - −82° F., vol %: 1.96

Light naphtha
Range, °F.: 82-200
Yield, vol %: 6.10
Paraffins, %: 77.35
Naphthenes, %: 20.38
Aromatics, %: 2.28
RON clear: 65.6

Heavy naphtha
Range, °F.: 200-300
Yield, vol %: 9.27
Sulfur, wt %: 0.0
P/N/A, %: 55.4/33.0/11.5

Naphtha
Range, °F.: 300-350
Yield, vol %: 5.0
P/N/A, %: 50.0/32.5/17.5

Kerosine
Range, °F.: 350-400
Yield, vol %: 4.95
Sulfur, wt %: 0.027
Aromatics, %: 19.5
Smoke pt, mm: 24.5
Cetane no.: 56.12
Cetane index: 47.2

Gas oil
Range, °F.: 400-500
Yield, vol %: 9.39
Gravity, °API: 40.65
Sulfur, wt %: 0.17
Aromatics, %: 19.7
Smoke pt, mm: 20.61
Cetane no.: 50.02
Aniline pt, °F.: 147.34
Cetane index: 50.3

Gas oil
Range, °F.: 500-550
Yield, vol %: 4.69
Gravity, °API: 36.9
Sulfur, wt %: 0.44

Gas oil
Range, °F.: 550-650
Yield, vol %: 9.49
Gravity, °API: 33.4
Sulfur, wt %: 0.78
Cetane no.: 54.81
Aniline pt, °F.: 166.46
Cetane index: 58.1

Residue
Range, °F.: 650+
Yield, vol %: 49.15
Gravity, °API: 18.16
Sulfur, wt %: 1.97
Ni/V, ppm: 20/180

La Rosa Medium, Venezuela

La Salina, Lake Maracaibo

Crude
Gravity, °API: 25.3
Sulfur, wt %: 1.73
Pour pt, °F.: <−50
Rvp, psi: 4.0
Neut. no., mg KOH/g: 0.90
Vis. kin., cSt @ 122° F.: 24.0
Yield, C_5 & lighter: 1.34

Distillation

°F.	**Yield, vol %:**	
	On crude	Cum.
C_2-C_5	1.34	1.34
158	2.47	3.80
212	2.33	6.13
302	5.40	11.52
401	6.69	18.21
509	7.81	26.01
650	13.22	39.23
698	5.63	44.85
752	6.33	51.17
752+	48.83	100.00

Residue
Range, °F.: 752+
Yield, vol %: 48.83
Gravity, °API: 12.1
Sulfur, wt %: 2.63
Con. carbon, wt %: 12.85
V/Ni, ppm: 413/43
Kin. vis., cSt @ 140° F.: 2,397

Leona, Venezuela

Puerto La Cruz, State of Anzoategui

Crude
Gravity, °API: 24.1
Sulfur, wt %: 1.5
Vis., SUS @ 122° F.: 305
Pour pt, °F.: −45
Rvp: 5.5
Yield, 0°(IVT)-82° F., vol %: 0.99

Naphtha
Range, °F.: 82-200
Yield, vol %: 4.34
RON clear: 63.9

Heavy naphtha
Range, °F.: 200-300
Yield, vol %: 6.71
Sulfur, wt %: 0.005
Paraffins, %: 49.85
Naphthenes, %: 32.13
Aromatics, %: 18.01

Naphtha
Range, °F.: 300-350
Yield, vol %: 3.34

Kerosine
Range, °F.: 350-400
Yield, vol %: 3.39
Sulfur, wt %: 0.05
P/N/A, %: 34.6/43.9/21.5
Smoke pt, mm: 18.15
Cetane no.: 44.78
Aniline pt, °F.: 135.13
Cetane index: 43.23

Gas oil
Range, °F.: 400-500
Yield, vol %: 10.51
Gravity, °API: 36.39
Sulfur, wt %: 0.19
Smoke pt, mm: 16.14
Cetane no.: 50.18
Aniline pt, °F.: 149.11
Cetane index: 46.50

Gas oil
Range, °F.: 500-550
Yield, vol %: 5.31
Sulfur, wt %: 0.56

Gas oil
Range, °F.: 550-650
Yield, vol %: 10.32
Gravity, °API: 28.46
Sulfur, wt %: 0.92
Pour pt, °F.: 17.79

Residue
Range, °F.: 650+
Yield, vol %: 55.11
Gravity, °API: 12.28
Sulfur, wt %: 2.3
Ni/V, ppm: 26/176

Loreto, Peru

Puerto Bayovar

Crude
Gravity, °API: 34.0
Sulfur, wt %: 0.29
Pour pt, °F.: 34
Vis., SUS @ 80° F.: 53.3
V/Ni, ppm: 63/34

Light naphtha
Range, °C.: Ibp-45
Yield, vol %: 2.41

Naphtha
Range, °C.: 45-104
Yield, vol %: 7.11
Paraffins, vol %: 68.3
Naphthenes, vol %: 29.9
Aromatics, vol %: 1.8

Heavy naphtha
Range, °C.: 104-199
Yield, vol %: 18.24
P/N/A, vol %: 49.9/39.2/10.3

Kerosine
Range, °C.: 199-288
Yield, vol %: 18.95
Sulfur, wt %: 0.05
Pour pt, °C.: −37
Cetane index: 46.3

Residue
Range, °C.: 343+
Yield, vol %: 41.3
Gravity, °API: 18.9
Sulfur, wt %: 0.51

Maya, Mexico

Pajaritos, Veracruz and Salina Cruz (Pacific), Oaxaca

Crude
Gravity, °API @ 60° F.: 22.0
Sulfur, wt %: 3.32
Pour test, °F.: 0
Vis., SUS @ 70° F.: 1,024.57
Vis., SUS @ 100° F.: 333.62
Rvp, psi @ 100° F.: 4.7
Hydrogen sulfide, ppm: 199
NC_4 & lighter, vol %: 1.5

Light straight run
Range, °F.: 60-200
Yield, vol %: 5.2
Total sulfur, wt %: 0.025
RON clear: 57.7
RON + 3 ml TEL/gal: 80.9

Naphtha
Range, °F.: 60-400
Yield, vol %: 19.7
Paraffins, vol %: 60.60
Naphthenes, vol %: 27.03
Aromatics, vol %: 12.37
Total sulfur, wt %: 0.213
RON clear: 38.1
RON + 3 ml TEL/gal: 57.6

Kerosine
Range, °F.: 400-500
Yield, vol %: 9.6
Gravity, °API: 39.6
Freezing pt, °F.: −29
P/N/A, vol %: 45.4/33.7/20.9
Total sulfur, wt %: 1.16
Aniline pt, °F.: 142.2
Smoke pt, mm: 20

Light gas oil
Range, °F.: 500-650
Yield, vol %: 12.8
Gravity, °API: 30.6
Pour pt, °F.: +30
P/N/A, vol %: 36.8/34.1/29.1
Total sulfur, wt %: 2.17
Carbon residue, Rams., wt %: 0.08
Aniline pt, °F.: 152.8
Cetane index: 51.0

Topped crude
Range, °F.: 650+
Yield, vol %: 56.4
Gravity, °API: 7.7
Vis., SUS @ 210° F.: 3,370.63
Vis., SUS @ 122° F.: 23,755.00
Pour pt, °F.: +115
Total sulfur, wt %: 5.04
Carbon residue, Rams., wt %: 17.83
Nitrogen, %: 0.4245
Ni/V, ppm: 87.8/535.0

Vacuum gas oil
Range, °F.: 650-1,100+
Yield, vol % (of crude): 25.2
Gravity, °API: 18.3
Aniline pt, °F.: 167.4
Vis., SUS @ 130° F.: 270.17
Pour pt, °F.: +105
Sulfur, wt %: 3.14
Carbon residue, Rams., wt %: 0.69
Ni/V, ppm: 0.9/1.9

Vacuum residue
Range, °F.: 1,100+
Yield, vol % (of crude): 31.2
Gravity, °API: 0.5
Vis., SUS @ 275° F.: Too hard
Sulfur, wt %: 5.78
Carbon residue, Rams., wt %: 26.2
Ni/V, ppm: 149/913

Merey, Venezuela

Puerto La Cruz, State of Anzoategui

Crude
Gravity, °API: 17.4
Sulfur, wt %: 2.2
Vis., SUS @ 100° F.: 1,207
Pour pt, °F.: −10
Yield, 0°(IVT)-82° F., vol %: 0.54

Light naphtha
Range, °F.: 82-200
Yield, vol %: 1.61
RON clear: 74.7

Heavy naphtha
Range, °F.: 200-300
Yield, vol %: 3.21
Sulfur, wt %: 0.01
Paraffins, vol %: 43.9
Naphthenes, vol %: 41.55
Aromatics, vol %: 15.17

Naphtha
Range, °F.: 300-350
Yield, vol %: 1.91
Sulfur, wt %: 0.036
P/N/A, vol %: 43.19/42.30/14.50

Kerosine
Range, °F.: 350-400
Yield, vol %: 2.37
Sulfur, wt %: 0.09
Aromatics, vol %: 13.95
Smoke pt, mm: 21.37
Aniline pt, °F.: 126.6

Gas oil
Range, °F.: 400-500
Yield, vol %: 7.21
Gravity, °API: 34.89
Sulfur, wt %: 0.33
Aromatics, vol %: 17.10
Smoke pt, mm: 13.45
Cetane no.: 35.62
Aniline pt, °F.: 135.51
Cetane index: 38.94

Gas oil
Range, °F.: 500-550
Yield, vol %: 4.52
Gravity, °API: 30.82
Sulfur, wt %: 0.7037

Gas oil
Range, °F.: 550-650
Yield, vol %: 10.47
Gravity, °API: 27.13
Sulfur, wt %: 1.15

Residue
Range, °F.: 650+
Yield, vol %: 68.16
Sulfur, wt %: 2.8
Ni/V, ppm: 74.77/301.08

Oriente, Ecuador

Puerto Balao/ Esmeraldas, Ecuador

Crude
Gravity, °API: 29.2
Sulfur, wt %: 1.01
Vis., cSt @ 104° F.: 13.0
Pour pt, °F.: 25.0
C_4 & lighter, vol %: 4.7
Rvp @ 100° F., psi: 3.70
Ni/V, ppm: 39/65

Light naphtha
Range, °F.: Ibp-200
Yield, vol %: 3.9
Sulfur, wt %: 0.001
Paraffins, vol %: 62.4
Naphthenes, vol %: 35.0
Aromatics, vol %: 2.6
RON clear: 67.3

Heavy naphtha
Range, °F.: 200-400
Yield, vol %: 17.3
Sulfur, wt %: 0.01
P/N/A, vol %: 44.9/45.8/9.3
RON clear: 45.9
Aniline pt, °F.: 130

Kerosine
Range, °F.: 400-500
Yield, vol %: 6.4
Gravity, °API: 40.6
Sulfur, wt %: 0.16
Vis., cSt @ 104° F.: 1.78
Smoke pt, mm: 20
Freezing pt, °F.: −41
Aniline pt, °F.: 142

Gas oil
Range, °F.: 500-620
Yield, vol %: 14.7
Gravity, °API: 35.1
Sulfur, wt %: 0.49
Vis., cSt @ 104° F.: 3.33
Pour pt, °F.: 5
Aniline pt, °F.: 153

Vacuum gas oil
Range, °F.: 620-1,000
Yield, vol %: 32.0
Gravity, °API: 25.2
Sulfur, wt %: 1.14
Vis., cSt @ 104° F.: 33.0
Pour pt, °F.: 90
Ni/V, ppm: 1/<1

Residue
Range, °F.: 620+
Yield, vol %: 51.5
Gravity, °API: 17.0
Sulfur, wt %: 1.66
Vis., cSt @ 104° F.: 649
Vis., cSt @ 212° F.: 34.1

Tia Juana Light, Venezuela

La Salina, State of Zulia

Crude
Gravity, °API: 32.1
Sulfur, wt %: 1.1
Kin. vis., SSU @ 100° F.: 60
Pour pt, °F.: −45
Yield, 0°(IVT)-82° F., vol %: 2.16

Light naphtha
Range, °F.: 82-200
Yield, vol %: 5.19

Heavy naphtha
Range, °F.: 200-300
Yield, vol %: 10.82
Sulfur, wt %: 0.0017
Paraffins, %: 65.99
Naphthenes, %: 24.30
Aromatics, %: 9.71
RON clear: 53.6

Naphtha
Range, °F.: 300-350
Yield, vol %: 4.82
Sulfur, wt %: 0.0077
P/N/A, %: 51.23/31.69/17.08

Kerosine
Range, °F.: 350-400
Yield, vol %: 4.64
Sulfur, wt %: 0.0281
P/N/A, %: 45.77/35.64/18.58
Smoke pt, mm: 23.37
Aniline pt, °F.: 134.99

Gas oil
Range, °F.: 400-500
Yield, vol %: 10.41
Gravity, °API: 40.72
Sulfur, wt %: 0.11
Smoke pt, mm: 14.99
Aniline pt, °F.: 147.31
Cetane index: 50.43

Gas oil
Range, °F.: 500-550
Yield, vol %: 4.96
Gravity, °API: 36.17
Sulfur, wt %: 0.4540
Smoke pt, mm: 11.99
Aniline pt, °F.: 158.47

Gas oil
Range, °F.: 550-650
Yield, vol %: 9.25
Gravity, °API: 32.39
Sulfur, wt %: 0.78
Smoke pt, mm: 14.42
Aniline pt, °F.: 168.05

Residue
Range, °F.: 650+
Yield, vol %: 47.75
Gravity, °API: 16.46
Sulfur, wt %: 1.87
Ni/V, ppm: 26/224

Tia Juana Pesado (Heavy), Venezuela

Puerto Miranda, Lake Maracaibo

Crude
Gravity, °API: 12.10
Sulfur, wt %: 2.7
Kin. vis., cSt @ 122° F.: 2,983
Pour pt, °F.: 30
Yield, 0°(IVT)-82° F., vol %: 0.08

Naphtha
Range, °F.: 82-200
Yield, vol %: 0.10

Heavy naphtha
Range, °F.: 200-300
Yield, vol %: 0.53
Sulfur, wt %: 0.209

Naphtha
Range, °F.: 300-350
Yield, vol %: 0.52
Sulfur, wt %: 0.21

Kerosine
Range, °F.: 350-400
Yield, vol %: 0.90
Sulfur, wt %: 0.24
Aromatics, %: 13.31
Smoke pt, mm: 20.53
Aniline pt, °F.: 122.34

Gas oil
Range, °F.: 400-500
Yield, vol %: 4.52
Gravity, °API: 31.9
Sulfur, wt %: 0.6
Smoke pt, mm: 13.26
Aniline pt, °F.: 128.0
Cetane no.: 32.46
Cetane index: 33.27

Gas oil
Range, °F.: 500-550
Yield, vol %: 3.12
Sulfur, wt %: 0.93

Gas oil
Range, °F.: 550-650
Yield, vol %: 7.92
Gravity, °API: 22.96
Sulfur, wt %: 1.51

Residue
Range, °F.: 650+
Yield, vol %: 82.15
Gravity, °API: 8.94
Sulfur, wt %: 3.0
V, ppm: 532

Bombay High, India

Floating storage in Arabian Sea producing area

Crude
Gravity, °API: 39.35
Rvp @ 38° C., kg/sq cm: 0.34
Pour pt, °C.: +30
Kin. vis., cSt @ 40° C.: 3.28
Sulfur, wt %: 0.17
Salt content, lb/1,000 bbl: 11
Con. carbon, wt %: 1.2
Wax (E.H.), wt %: 10.6
Yield, vol %: 20.6
Gravity, °API: 58.42
Charac. factor K UOP: 11.7
V/Ni/Fe, ppm: 0.3/1.0/<0.3

Naphtha
Range, °C.: C_5–150
Yield, wt %: 18.6
Rvp, Kg/sq cm @ 38° C.: 0.42
Sulfur, total, ppm: 3.0
Mercaptan sulfur, ppm: 1.3
Paraffins, vol %: 53.7
Napthenes, vol %: 25.0
Aromatics, vol %: 21.3
RON, clear: 69.6
RON + 0.56 g Pb/l as TEL: 82.1

Kerosine
Range, °C.: 140–240
Yield, wt %: 19.3
Yield, vol %: 19.6
Gravity, °API: 43.75
Sulfur, total, ppm: 66
Mercaptan sulfur, ppm: 1.5
Flash pt, (Abel), °C.: 46.5
Smoke pt, mm: 19
Freezing pt, °C.: – 54.0
Aniline pt, °C.: 52.2
Kin. vis., cSt @ – 30° C.: 4.18
P/N/A, vol %: 39.8/23.9/26.3

Gas oil
Range, °C.: 240–370
Yield, wt %: 25.6
Yield, vol %: 25.2
Gravity, °API: 34.25
Pour pt, °C.: + 3
Kin. vis., cSt @ 37.8° C.: 4.17
Sulfur, total, wt %: 0.14
Aniline pt, °C.: 73.2
Diesel index: 56

Vacuum gas oil
Range, °C.: 370–550
Yield, wt %: 29.3
Yield, vol %: 27.5
Gravity, °API: 29.86
Pour pt, °C.: + 51
Kin. vis., cSt @ 70° C.: 11.0
Kin. vis., cSt @ 98.9° C.: 5.65
Con. carbon, wt %: 0.17
Asphaltene, wt %: 0.06
V/Ni/Cu/Fe, ppm: <0.3/<0.3/<0.1/<0.3

Residue
Range, °C.: 370+
Yield, vol %: 34.6
Yield, vol %: 31.0
Gravity, °API: 21.24
Pour pt, °C.: + 51
Sulfur, total, wt %: 0.38
Kin. vis., cSt @ 98.9° C.: 14.37
Kin. vis., cSt @ 70° C.: 24.66
Con. carbon, wt %: 4.33
Asphaltene, wt %: 1.22
V/Ni/Cu/Fe, ppm: 0.8/2.8/<0.1/0.35

Residue
Range, °C.: 550+
Yield, wt %: 5.3
Yield, vol %: 3.5
Gravity, °API: 7.86
Pour pt, °C.: +78
Sulfur, total, wt %: 0.77
Kin. vis., cSt @ 98.9° C.: 1,396.58
Con. carbon, wt %: 23.70
Asphaltene, wt %: 8.40
V/Ni/Cu/Fe, ppm: 5.0/18.0/<0.1/1.9

North America

Bow River Heavy, Alberta

*Bow River Pipe Lines Ltd. to Edmonton**

Crude
Gravity, °API: 26.7
Sulfur, g/kg: 21.0
Rvp, kPa: 37.2
Pour pt, °C.: –50.0
Con. carbon, wt %: 6.70
Vis., cSt @ 40° C.: 18.30
Ni/V, wt ppm: 20.7/54.0
C_3, yield, vol %: 0.41
C_4s, yield, vol %: 1.47

Naphtha
Range, °C.: C_5-190
Yield, vol %: 20.40
Sulfur, g/kg: 0.61
Paraffins, vol %: 65.50
Olefins, vol %: 0.40
Naphthenes, vol %: 26.80
Aromatics, vol %: 7.30

Kerosine
Range, °C.: 190-277
Yield, vol %: 13.10
Sulfur, g/kg: 4.40
P/O/N/A, vol %: 73.20/2.60/0.00/24.20
Aniline pt, °C.: 57.7
Pour pt, °C.: –60.6
Cetane no.: 44.0
Cetane index: 52.3
Smoke pt, mm: 27.0

Distillate
Range, °C.: 277-343
Yield, vol %: 10.80
Gravity, °API: 29.6
Sulfur, g/kg: 10.30
Aromatics, vol %: 55.10
Aniline pt, °C.: 63.9
Pour pt, °C.: – 35.0
Cetane no.: 46.0
Cetane index: 49.6
Vis., cSt @ 38° C.: 5.57

Gas oil
Range, °C.: 343-565°
Yield, vol %: 32.50
Gravity, °API: 20.9
Sulfur, g/kg: 21.00
Total nitrogen, wt %: 0.03
Pour pt, °C.: 12.1
Con. carbon, wt %: 0.60
Vis. cSt @ 38° C.: 57.30
Ni/V, ppm: 0.00/0.12

Residue
Range, °C.: 565+
Yield, vol %: 23.20
Gravity, °API: 5.3
Sulfur, g/kg: 38.20
Pour pt, °C.: 73.0
Vis., cSt @ 135° C.: 940
Penetration @ 25° C.: 19
Ni/V, wt ppm: 67.70/169.00

*Has access to Interprovincial and Trans Mountain pipelines at Edmonton

Cold Lake,* Alberta

Alberta Oil Sands Pipeline Ltd. to Edmonton†

Crude
Density, g/cu cm: 0.9031
Sulfur, wt %: 2.91
Vis., cSt @ 15° C.: 70.7

Neut. No.: 0.71
Nitrogen, wt %: 0.29
Pour pt, °C.: − 60
C_5 & lighter yield, vol %: 7.43

Naphtha
Range, °C.: 20-175
Yield, vol %: 30.0
RON clear: 63.7
Sulfur, wt %: 0.06

Distillate
Range, °C.: 175-295
Yield, vol %: 10.5
Density, kg/cu cm: 0.7983
Sulfur, wt %: 0.76
Aniline pt, °C.: 56
Vis., cSt @ 40° C.: 2.0
Freezing pt, °C.: − 61.5
Pour pt, °C.: − 51
Smoke pt, °C.: 18.4

Gas oil
Range, °C.: 343-517
Yield, vol %: 18.7
Density, kg/cu cm @ 15° C.: 0.9536
Sulfur, wt %: 2.96
Nitrogen, wt %: 0.08
Ni/V, wt ppm: 0.05/0.15

Residium
Range, °C.: 343+
Yield, vol %: 51.6
Density, kg/cu cm: 1.0203
Sulfur, wt %: 4.8
Vis., cSt @ 60° C.: 7,750
Pour pt, °C.: +51
Ni/V/Fe, wt ppm: 90.6/213.7/12.8

Asphalt
Range, °C.: 405+
Yield, vol %: 47.8
Density @ 15° C., kg/cu m: 1,030.7
Pen. @ 25° C. (100/5): 343
Pen. @ 4° C. (100/5): 36
Pen. index: − 1.01
Vis. @ 60° C., Poises: 298
Vis. @ 100° C., cSt: 994

Asphalt
Range, °C.: 470+
Yield, vol %: 37.7
Density @ 15° C., kg/cu m: 1,046.9
Pen. @ 25° C. (100/5): 60
Pen. @ 4° C. (100/5): 6
Pen. index: − 0.46
Vis. @ 60° C., Poises: 3,576
Vis. @ 100° C., cSt: 4,894

*Diluent added to crude to permit pipeline transportation. This assay made on blend of 28 wt % mixed condensate (gravity, °API, 58.9) and 72 wt % Cold Lake Crude that had the following characteristics:

Gravity, °API: 13.2
Density @ 15° C.: 0.9770
Sulfur, wt %: 4.11
Nitrogen, wt %: 0.42
Pour pt, °C.: − 4
Vis., cSt @ 40° C.: 1,057
Vis., cSt @ 80° C.: 98

†Has access to Interprovincial and Trans Mountain pipelines at Edmonton

Federated Light and Medium, Alberta

*Federated Pipe Line Ltd. to Edmonton**

Crude
Gravity, °API: 39.7
Sulfur, g/kg: 2.01
Total nitrogen, wt %: 0.11
Rvp, kPa: 31.0
Pour pt, °C.: − 10.0
Con. carbon, wt %: 1.46
Vis. cSt @ 40° C.: 3.30
Wax, wt %: 9.12
Neut. value, mg: 0.00
Ni/V, ppm: 0.07/0.00
C_4 & lighter, vol %: 3.43

Naphtha
Range, °C.: C_5-190
Yield, vol %: 30.90
Sulfur, g/kg: 0.05
Paraffins, vol %: 28.30
Naphthenes, vol %: 54.90
Aromatics, vol %: 16.80
RON clear: 56.4

Kerosine
Range, °C.: 190-277
Yield, vol %: 18.25
Gravity, °API: 41.0
Sulfur, g/kg: 0.68
Aromatics, vol %: 23.00
Aniline pt, °C.: 142.0
Pour pt, °C.: − 40.0
Freezing pt, °C.: − 39.0
Cetane no.: 47.0

Distillate
Range, °C.: 277-343
Yield, vol %: 13.73
Gravity, °API: 34.6
Sulfur, g/kg: 1.97
Aniline pt, °C.: 80.7
Pour pt, °C.: − 7.5
Cetane no.: 55.0
Cetane index: 49.0
Vis., cSt @ 38° C.: 4.43

Gas oil
Range, °C.: 343-565
Yield, vol %: 28.29
Gravity, °API: 25.6
Sulfur, g/kg: 3.10
Total nitrogen, wt %: 0.16
Pour pt, °C.: 40.0
Con. carbon, wt %: 0.45
Vis., cSt @ 50° C.: 29.32
Ni/V, wt ppm: 1.24/0.00

Residue
Range, °C.: 565+
Yield, vol %: 8.83
Gravity, °API: 15.2
Sulfur, g/kg: 5.40
Pour pt, °C.: 26.0
Vis., cSt @ 135° C.: 30.64
Ni/V, wt ppm: 9.50/5.70

*Has access to Interprovincial and Trans Mountain pipelines at Edmonton.

Gulf Alberta, L & M

*Gulf Alberta Pipeline to Edmonton**

Crude
Gravity, °API: 35.1
Sulfur, g/kg: 9.80
H_2S, wt ppm: 58.1
Rvp, kPa: 36.4
Pour pt, °C.: − 27.5
Vis., cSt @ 40° C.: 4.86
Ni/V, wt ppm: 10.10/9.00
C_4 & lighter, yield, vol %: 3.50

Naphtha
Range, °C.: C_5-190
Yield, vol %: 30.60
Sulfur, g/kg: 0.36
Paraffins, vol %: 56.04
Olefins, vol %: 0.00
Naphthenes, vol %: 31.53
Aromatics, vol %: 12.43

Kerosine
Range, °C.: 190-277
Yield, vol %: 14.20
Gravity, °API: 39.9
Sulfur, g/kg: 2.76
Aromatics, vol %: 28.13
Aniline pt, °C.: 59.7
Pour pt, °C.: − 40.0
Cetane no.: 46.0
Cetane index: 49.0
Smoke pt, mm: 19.0

Distillate
Range, °C.: 277-343
Yield, vol %: 8.53
Gravity, °API: 22.1
Sulfur, g/kg: 7.67
Aniline pt, °C.: 70.0
Pour pt, °C.: − 10.0
Cetane no.: 52.0
Cetane index: 55.0
Vis., cSt @ 38° C.: 5.14

Gas oil
Range, °C.: 343-565
Yield, vol %: 31.43
Gravity, °API: 23.8
Sulfur, g/kg: 12.72
Total nitrogen, wt %: 0.13
Pour pt, °C.: 31.0
Con. carbon, wt %: 0.23
Vis., cSt @ 38° C.: 44.22
Ni/V, ppm: 0.40/0.00

Residue
Range, °C.: 565+
Yield, vol %: 15.2
Gravity, °API: 14.6
Sulfur, g/kg: 23.87
Pour pt, °C.: 44.0
Vis., cSt @ 135° C.: 59.97
Ni/V, wt ppm: 24.10/25.10

*Access to Interprovincial and Trans Mountain pipelines at Edmonton.

Lloydminster,* Alberta and Saskatchewan

Husky Oil Operations Ltd. pipeline to Hardisty, Alta.†

Crude
Gravity, °API: 20.7
Sulfur, g/kg: 31.5
Rvp, kPa: 30.3
Pour pt, °C.: − 32.0
Con. carbon, wt %: 9.18
Vis., cSt @ 40° C.: 101.00
Neut. value, mg: 0.78
Ni/V, wt ppm: 52.70/10.50
C_4 & lighter, yield, vol %: 0.48

Naphtha
Range: C_5-190°
Yield, vol %: 19.50
Sulfur, g/kg: 0.79
Paraffins, vol %: 55.10
Olefins, vol %: 1.50
Naphthenes, vol %: 31.60
Aromatics, vol %: 11.80

Kerosine
Range, °C.: 190-277
Yield, vol %: 9.80
Gravity, °API: 34.9
Sulfur, g/kg: 5.05
Aromatics, vol %: 22.40
Aniline pt, °C.: 52.4
Pour pt, °C.: − 63.3
Cetane no.: 35.0
Smoke pt, mm: 19.0

Distillate
Range, °C.: 277-343
Yield, vol %: 9.50

Gravity, °API: 26.5
Sulfur, g/kg: 8.45
Aromatics, vol %: 38.90
Aniline pt, °C.: 56.5
Pour pt, °C.: − 31.1
Cetane no.: 40.0
Cetane index: 41.5
Vis., cSt @ 38° C.: 6.32

Gas oil
Range, °C.: 343-565
Yield, vol %: 25.20
Gravity, °API: 17.5
Sulfur, g/kg: 28.50
Aniline pt, °C.: 72.2
Pour pt, °C.: 1.7
Con. carbon, wt %: 0.55
Vis., cSt @ 38° C.: 155.00
Ni/V, wt ppm: 0.00/0.10

Residue
Range, °C.: 565+
Yield, vol %: 36.00
Gravity, °API: 2.9
Sulfur, g/kg: 56.90
Pour pt, °C.: 69.0
Con. carbon, wt %: 25.10
Vis., cSt @ 135° C.: 3,260
Ni/V, wt ppm: 123/231

*Crude has been blended with pipeline condensate to permit transportation. Typically 20-25% condensate is added to crude.
†Has access to Interprovincial pipeline at Hardisty.

Rainbow Light and Medium, Alberta

*Rainbow Pipe Line Co. Ltd. to Edmonton**

Crude
Gravity, °API: 40.7
Sulfur, g/kg: 5.00
H_2S, wt ppm: 10.2
Rvp, kPa: 33.9
Pour pt, °C.: 2.5
Con. carbon, wt %: 1.65
Vis., cSt @ 40° C.: 3.77
Wax, wt %: 20.40
Neut. value, mg: 0.08
Ni/V, wt ppm: 0.85/0.50
C_4 & lighter, yield, vol %: 3.40

Naphtha
Range, °C.: C_5-190
Yield, vol %: 38.70
Sulfur, g/kg: 0.14
Paraffins, vol %: 61.25
Naphthenes, vol %: 25.96
Aromatics, vol %: 12.79
RON clear: 51.2
MON clear: 51.4

Kerosine
Range, °C.: 190-277
Yield, vol %: 13.00
Gravity, °API: 42.2
Sulfur, g/kg: 1.20
Aromatics, vol %: 24.23
Aniline pt, °C.: 62.3
Pour pt, °C.: − 37.5
Freezing pt, °C.: − 35.0
Cetane no.: 46.0
Cetane index: 47.8
Smoke pt, mm: 20.0
Vis., cSt @ 40° C.: 1.55

Distillate
Range, °C.: 277-343
Yield, vol %: 11.50
Gravity, °API: 35.0
Sulfur, g/kg: 4.40
Aniline pt, °C.: 75.5
Pour pt, °C.: − 5.0
Cetane no.: 59.0
Cetane index: 55.0
Vis., cSt @ 38° C.: 4.51

Gas oil
Range, °C.: 343-565
Yield, vol %: 31.65
Sulfur, g/kg: 8.04
Total nitrogen, wt %: 0.69
Pour pt, °C.: 26.0
Con. carbon, wt %: 0.16
Vis., cSt @ 50° C.: 20.39
Asphaltenes, vol %: 4.10
Ni/V, wt ppm: 0.02/0.00

Residue
Range, °C.: 565+
Yield, vol %: 5.15
Gravity, °API: 19.6
Sulfur, g/kg: 10.71
Total nitrogen, wt %: 3.22
Pour pt, °C.: 28.0
Con. carbon, wt %: 11.11
Vis., cSt @ 135° C.: 27.82
Asphaltenes, wt %: 13.42
Ni/V, wt ppm: 4.60/2.90

*Has access to Interprovincial and Trans Mountain pipelines at Edmonton.

Rangeland-South L & M, Alberta

Rangeland Pipe Line Co. to Canadian/U.S. border near Carway, Alta.

Crude
Gravity, °API: 39.5
Sulfur, g/kg: 7.52
H_2S, wt ppm: 20.1
Rvp, kPa: 39.3
Pour pt, °C.: − 40.0
Con. carbon, wt %: 0.69
Vis., cSt @ 40° C.: 2.67
Wax, wt %: 12.44
Neut. value, mg: 0.12
Ni/V, wt ppm: 1.20/1.40
C_4 & lighter, yield, wt %: 3.22

Naphtha
Range, °C.: C_5-190
Yield, vol %: 38.75
Sulfur, g/kg: 0.12
Rvp, kPa: 41.1
Paraffins, vol %: 42.45
Naphthenes, vol %: 36.86
Aromatics, vol %: 20.69
RON clear: 58.5
MON clear: 57.3

Kerosine
Range, °C.: 190-277
Yield, vol %: 15.50
Gravity, °API: 38.3
Sulfur, g/kg: 1.87
Aromatics, vol %: 24.0
Aniline pt, °C.: 62.0
Pour pt, °C.: − 37.5
Freezing pt, °C.: − 28.5
Cetane no.: 48.0
Smoke pt, mm: 20.0

Distillate
Range, °C.: 277-343
Yield, vol %: 8.55
Gravity, °API: 32.0
Sulfur, g/kg: 4.79
Aniline pt, °C.: 71.0
Pour pt, °C.: − 7.5
Cetane no.: 51.0
Cetane index: 52.0
Vis., cSt @ 38° C.: 5.24

Gas oil
Range, °C.: 343-565
Yield, vol %: 33.20
Gravity, °API: 26.5
Sulfur, g/kg: 11.64
Total nitrogen, wt %: 0.62
Aniline pt, °C.: 86.6
Pour pt, °C.: 24.0
Con. carbon, wt %: 0.10
Vis., cSt @ 38° C.: 42.02

Residue
Range, °C.: 565+
Yield, vol %: 4.0
Gravity, °API: 21.7
Sulfur, g/kg: 12.19
Pour pt, °C.: 27.5
Vis., cSt @ 135° C.: 18.75
Asphaltenes, wt %: 10.13
Ni/V, wt ppm: 3.0/7.4

Wainwright—Kinsella,* Alberta

Husky Oil Operations Ltd. pipeline to Hardisty, Alta.†

Crude
Gravity, °API: 23.1
Sulfur, g/kg: 15.80
Rvp, kPa: 30.3
Pour pt, °C.: − 39.0
Con. carbon, wt %: 6.70
Vis., cSt @ 40° C.: 32.50
Ni/V, ppm: 40.30/79.90

Naphtha
Range, °C: C_5-190
Yield, vol %: 19.0
Sulfur, g/kg: 0.50
Paraffins, vol %: 52.50
Naphthenes, vol %: 37.80
Aromatics, vol %: 8.90

Kerosine
Range, °C.: 190-277
Yield, vol %: 12.00
Gravity, °API: 36.3
Sulfur, g/kg: 3.44
Aromatics, vol %: 22.80
Aniline pt, °C.: 56.7
Freezing pt, °C.: − 51.6
Cetane no.: 37.0
Smoke pt, mm: 26.0

Distillate
Range, °C.: 277-343
Yield, vol %: 11.0
Gravity, °API: 28.1
Sulfur, g/kg: 10.50
Aromatics, vol %: 33.70
Aniline pt, °C.: 60.5
Pour pt, °C.: − 22.0
Cetane no.: 42.0
Cetane index: 43.9
Vis., cSt @ 38° C.: 5.69

Gas oil
Range, °C.: 343-565
Yield, vol %: 26.00
Gravity, °API: 19.1
Sulfur, g/kg: 21.80
Total nitrogen, wt %: 0.03
Pour pt, °C.: 12.8
Vis., cSt @ 38° C.: 131.0
Con. carbon, wt %: 0.55
Ni/V, wt ppm: 0.11/0.00

Residue
Range, °C.: 565+
Yield, vol %: 32.0
Gravity, °API: 3.7
Sulfur, g/kg: 52.60
Pour pt, °C.: 74.0
Vis., cSt @ 135° C.: 212.00
Asphaltenes, wt %: 19.10
Ni/V, ppm: 110/222

*Note: crude blended with condensate to permit transportation.
†Has access to Interprovincial Pipeline.

U.S.

Alaska North Slope (ANS, Sadlerochit)

Trans Alaska Pipeline to Valdez Terminal

Crude
Gravity, °API: 26.4
Sulfur, wt %: 1.06
Pour pt, °F.: 0
Rvp, psi: 3.55
Kin. vis. @ 60° F.: 42.42
H_2S, lb/1,000 bbl: 0.35
Salt, lb/1,000 bbl: 32.7
Carbon residue, wt %: 4.40
Neut. no. (D974): 1.12
Ni/V, ppm: 11/26
Nitrogen, ppm: 2,090
C_4 & lighter, yield, vol %: 1.17

Light gasoline
Range, °F.: C_5—150
Yield, vol %: 2.2
Sulfur, wt %: <0.001
RON clear: 71.5
MON clear: 69.8
RON + 0.5g TEL/gal: 78.4

Naphtha
Range, °F.: 150—380
Yield, vol %: 15.6
Sulfur, wt %: 0.013
Paraffins, vol %: 39.7
Naphthenes, vol %: 43.3
Aromatics, vol %: 17.0

Distillate
Range, °F.: 380—650
Yield, vol %: 28.6
Gravity, °API: 33.1
Sulfur, wt %: 0.414
Pour pt, °F.: − 25
Cetane No.: 45.8
Total N_2, ppm: 79
Aromatics, vol %: 33.6

Blended gas oil
Range, °F.: 650—840
Yield, vol %: 16.4
Gravity, °API: 23.8
Sulfur, wt %: 1.10
Aniline pt, °C.: 74.7
Pour pt, °F.: 70
Carbon residue, %: 0.012
Total nitrogen, ppm: 950
Basic nitrogen: 0.03

Residue
Range, °F.: 650+
Yield, vol %: 52.4
Gravity, °API: 15.0
Sulfur, wt %: 1.63
Carbon residue, %: 8.82
Total nitrogen, ppm: 3,600
Pour pt, °F.: 80
Kin. vis. @ 210° F.: 47.54
Kin. vis. @ 275° F.: 15.55

Note: This assay is of Sadlerochit crude, originally the only component of North Slope crude. Kuparuk crude is now blended at a rate of about 120,000 b/d with Sadlerochit at pumpstation No. 1. Total ANS stream is about 1.6 million b/d. See Kuparuk analysis in this section.

Kuparuk,* Alaska

Trans Alaska Pipeline to Valdez Terminal

Crude
Gravity, °API: 23.0
Sulfur, wt %: 1.76
Pour pt, °F.: − 55
Rvp, psi: 2.6
Kin. vis. @ 60° F., cSt: 79.98
H_2S, lb/1,000 bbl: <5
Carbon residue, wt %: 7.37
Ni/V, ppm: 19/57
Nitrogen, ppm: 1,980
C_5 & lighter, vol %: 2.12

Light gasoline
Range (TBP), °F.: C_5—150
Yield, vol %: 1.6
Sulfur, wt %: 0.006

Naphtha
Range, °F.: 150—380
Yield, vol %: 14.5
Sulfur, wt %: 0.018
Paraffins, vol %: 38.3
Naphthenes, vol %: 47.0
Aromatics, vol %: 14.7

Distillate
Range, °F.: 380—650
Yield, vol %: 26.9
Sulfur, wt %: 0.66
Pour pt, °F.: − 25
Cetane No.: 45.4
Vis., cSt @ 100° F.: 3.083
Aromatics, wt %: 30.0

Gas oil
Range, °F.: 650—840
Yield, vol %: 18.9
Gravity, °API: 20.5
Sulfur, wt %: 1.79
Aniline pt, °C.: 104.3
Pour pt, °F.: 50
Kin. vis. @ 100° F.: 34.20
Carbon residue, wt %: 0.01
Total nitrogen, ppm: 600
Basic nitrogen, wt %: 0.02
V/Ni, ppm: <1

Residue
Range, °F.: 650+
Yield, vol %: 56.0
Gravity, °API: 11.7
Sulfur, wt %: 2.59
Carbon residue, wt %: 12.61
Pour pt, °F.: 40
Kin. vis. @ 210° F.: 97.15

*About 120,000 b/d of Kuparuk is blended with some 1.6 million b/d of Sadlerochit crude to produce North Slope crude. Kuparuk contribution is expected to double by early 1985.

West Sak,* Alaska

Not in production

Crude
Gravity, °API: 22.4
Sulfur, wt %: 1.82
Pour pt, °F.: − 50
Rvp, psi: 2.70
Kin. vis. @ 60° F.: 95.92
Carbon residue, wt %: 7.62
Ni/V, ppm: 22/61
Neut. no. (D974): 0.68
C_4 & lighter, yield, vol %: 0.63

Light gasoline
Range, °F.: C_5—150
Yield, vol %: 1.9
Sulfur, wt %: 0.004

Naphtha
Range, °F.: 150—380
Yield, vol %: 14.4
Sulfur, wt %: 0.018
Paraffins, vol %: 36.4
Naphthenes, vol %: 48.2
Aromatics, vol %: 15.4

Distillate
Range, °F.: 380—650
Yield, vol %: 27.5
Gravity, °API: 31.6
Sulfur, wt %: 0.700
Pour pt, °F.: − 35
Cetane no.: 42.1
Aromatics, vol %: 31.4
Vis., cSt @ 100° F.: 3.34

Gas oil
Range, °F.: 650—840
Yield, vol %: 16.6
Gravity, °API: 21.1
Sulfur, wt %: 1.81
Pour pt, °F.: 60
Kin. vis. @ 100° F.: 43.99
Total nitrogen, ppm: 840
Basic nitrogen: 0.023

Residue
Range, °F.: 650+
Yield, vol %: 55.6
Gravity, °API: 10.8
Sulfur, wt %: 2.53
Carbon residue, wt %: 13.15
Pour pt, °F.: 45
Kin. vis. @ 210° F.: 135.3
Pentane insoluble, wt %: 14.97

*Crude not in production, but pilot program is underway in Kuparuk area to determine feasibility. Assay sample obtained during drill stem test.

Crude oil streams by country of origin*

Abu Dhabi, U.A.E.
Abu Al Bu Khoosh—Cie. Francaise des Petroles
Murban—Abu Dhabi National Oil Co.
Umm Shaif (Abu Dhabi Marine)—Adnoc
Zakum (Lower Zakum)—Adnoc

Algeria
Saharan Blend—Sonatrach
Zarzaitine—Sonatrach

Angola
Cabinda—Cabinda Gulf Oil Co.
Soyo Blend—Cia. de Petroles de Angola and Texaco Angola

Brunei
Champion Export—Brunei Shell
Seria Light—Brunei Shell

Cameroon
Kole Marine Blend—Elf Serepca

Canada
Bow River Heavy—Alberta Petroleum Marketing Commission
Cold Lake—Esso Petroleum Canada/APMC
Federated—APMC/Home Oil Ltd.
Gulf Alberta L & M—APMC/Gulf Canada
LLoydminster—Husky Oil Operations Ltd.
Rainbow Light & Medium—APMC/Mobil Oil Canada
Rangeland South—APMC/Dome Petroleum Ltd.
Wainwright-Kinsella—APMC/Husky Oil Operations Ltd.

China
Shengli—Petroleum Corp. of PRC
Taching (Daqing)—Petroleum Corp. of PRC

Congo (Brazzaville)
Djeno Blend (Djeno Melange)—Elf Congo

Denmark
Dan—Dansk Undergrunds Consortium (DUC)
Gorm—DUC

Divided Zone
Burgan (Wafra)—Getty and Kuwait Oil Co.
Eocene (Wafra)—Getty and Kuwait Oil Co.
Hout—Arabian Oil Co.
Khafji—AOC

Dubai, U.A.E
Dubai (Fateh)—Dubai Petroleum Co.

Ecuador
Oriente—Texaco

Egypt
Belayim—AGIP
Gulf of Suez Mix—Amoco

Gabon
Gamba—Elf Gabon
Lucina Marine—Elf Gabon
Mandji—Elf Gabon

Ghana
Salt Pond—Agri-Petco

India
Bombay High—Oil & Natural Gas Commission

Indonesia
Ardjuna—Atlantic Richfield Indonesia Inc.
Arimbi—ARCO Indonesia
Attaka—Union Oil Co. of Indonesia
Badak—Roy M. Huffington Inc.
Bekapai—Total Indonesie
Bunyu—Pertamina
Cinta—Independent Indonesian American Petroleum Co.
Duri (Sumatran Heavy)—Caltex Pacific Indonesia
Handil—Total Indonesie
Jatibarang—Pertamina
Minas (Sumatran Light)—Caltex Pacific Indonesia
Salawati—Phillips Petroleum Co., Indonesia
Sanga Sanga—Tesoro
Sepinggan—Yakin Mixed (4:1)—Union Oil Co. of Indonesia
Udang—Conoco of Indonesia
Walio—Petromer Trend Corp.

Iran
Aboozar (Ardeshir)—National Iranian Oil Co.
Bahrgansar/Nowruz (Sirip Blend)—NIOC
Dorrood (Darius)—NIOC
Foroozan (Fereidoon)—NIOC
Iranian Heavy—NIOC
Iranian Light—NIOC
Rostam—NIOC
Salmon (Sassan)—NIOC
Sirri—NIOC
Soroosh (Cyrus), Iran—NIOC

Iraq
Basrah Heavy—Iraq National Oil Co.
Basrah Light—INOC
Basrah Medium—INOC
Kirkuk Blend—INOC

Ivory Coast
Espoir—Phillips Petroleum Co. Ivory Coast

Kuwait
Kuwait—Kuwait Oil Co.

Libya
Amna (high pour)—Libyan National Oil Corp.
Brega—LNOC
Bu Attifel—AGIP
Es Sider—Oasis
Sarir—LNOC
Sirtica—LNOC
Zueitina—Occidental

Malaysia
Bekok—Esso Malaysia
Bintulu—Shell Malaysia
Labuan Blend—Shell Malaysia
Miri Light—Shell Malaysia
Pulai—Esso Malaysia
Tapis—Esso Malaysia
Tapis Blend—Esso Malaysia
Tembungo—Esso Malaysia

Mexico
Isthmus—Pemex
Maya—Pemex

Nigeria
Bonny Light—Shell
Bonny Medium—Shell
Brass River—Phillips Oil Co. (Nigeria)
Escravos—Gulf Oil Co. (Nigeria)
Forcados Blend—Shell
Pennington—Texaco Overseas (Nigeria)
Qua Iboe (Nigerian Light)—Mobil Oil Nigeria

Norway
Ekofisk—Phillips Petroleum
Gullfaks—Statoil
Murchison—Conoco
Statfjord—Mobil

Oman
Oman Export—Petroleum Development (Oman) Ltd. and Elf Group

Qatar
Dukhan (Qatar land)—Qatar General Petroleum Corp.
Qatar Marine—QGPC

Saudi Arabia
Arabian Heavy (Safaniya)—Arabian American Oil Co.
Arabian Light—Aramco
Arabian Light (Berri)—Aramco
Arabian Medium (Khursaniyah)—Aramco
Arabian Medium (Zuluf/Marjan)—Aramco

Sharjah, U.A.E
Mubarek—Buttes Resources Co.

Syria
Souedie—Syrian Petroleum Co.

Trinidad
Galeota Mix (Trinidad Blend)—Amoco

Tunisia
Ashtart—Elf Aquitaine
El Borma—AGIP

United Kingdom
Argyll—Hamilton Bros.
Auk—Shell/Esso
Beatrice—Britoil
Beryl—Mobil
Brae—Marathon
Brent—Shell/Esso
Brent Blend
Buchan—BP
Cormorant, North—Shell/Esso
Cormorant, South (Cormorant "A")—Shell/Esso
Dunlin—Shell/Esso
Flotta—Occidental/Texaco
Forties—BP
Fulmar—Shell/Esso
Magnus—BP
Maureen—Phillips Petroleum
Montrose—Amoco
Murchison—Conoco
Ninian Blend—Chevron/Union/BP
Statfjord—Conoco
Tartan—Texaco
Thistle—Britoil

U.S.
Alaska North Slope (ANS, Sadlerochit)—Sohio/Exxon/ARCO
Kuparuk—ARCO
West Sak—ARCO

U.S.S.R.
Soviet Export Blend—V/O Sojuznefteexport

Venezuela
BCF 24—Affiliate of Petroleos de Venezuela
Bachaquero—Affiliate of Petroleos de Venezuela
Boscan—Affiliate of Petroleos de Venezuela
Ceuta—Affiliate of Petroleos de Venezuela
Lagomedio—Affiliate of Petroleos de Venezuela
La Rosa—Affiliate of Petroleos de Venezuela
Leona—Affiliate of Petroleos de Venezuela
Merey—Affiliate of Petroleos de Venezuela
Tia Juana Light—Affiliate of Petroleos de Venezuela
Tia Juana Pesado—Affiliate of Petroleos de Venezuela

Zaire
Zaire—Zaire Gulf Oil Co.

*Names in parentheses are former or secondary names of crudes. Companies listed are primary operators or sales contacts.

Colombia's Caño Limón crude ready for export

Richard Corbett
Refining Editor

The completion of the Caño Limón pipeline and offshore loading facilities last month put Colombia's new Caño Limón crude into the world crude oil trade. Operators of the field, Empresa Colombia de Petroleos (Ecopetrol), Occidental de Colombia Inc., and Shell de Colombia Inc., expect an initial tanker loading capability of 90,000 b/d with total capacity reaching 250,000 b/d in by July.

The crude oil will be loaded from a tanker-loading facility and a floating storage unit located offshore in the Carribean Sea at the Covenas marine terminal. The loading facility will have two CALM buoys each capable of handling 40,000 bbl/hr, and will be able to handle two shuttle tankers at once. Information regarding assays in this series, is in OGJ, Apr. 11, 1983.

Caño Limón, Colombia

Covenas terminal to two CALM in Carribean Sea

Crude
Gravity, °API: 30.8
Sulfur, wt %: 0.47
Salt, lb/1,000 bbl: 2.0
Pour pt.; °F.: 60
Vis., cSt @ 100° F.: 12.54
Vis., cSt @ 120° F.: 8.19
Neut. No., mg KOH/g: 0.27
Rvp, psi: 0.7
H_2S, scf/100 gal crude: 0.02

Light naphtha
Range, °F.: IBP −220
Gravity, °API: 72.6
Yield, vol %: 3.94
Sulfur, wt %: 0.02
Mercaptan sulfur, vol %: 0.0002
Paraffins, vol %: 76.2
Naphthenes, vol %: 23.2
Aromatics, vol %: 0.6
Rvp, psi: 8.4

Naphtha
Range, °F.: 220-300
Gravity, °API: 59.3
Yield, vol %: 6.83
Sulfur, wt %: 0.01
Paraffins, vol %: 55.9
Naphthenes, vol %: 42.5
Aromatics, vol %: 1.6

Heavy naphtha
Range, °F.: 300-360
Gravity, °API: 51.9
Yield, vol %: 5.64
Sulfur, wt %: 0.01
Paraffins, vol %: 52.7
Naphthenes, vol %: 43.9
Aromatics, vol %: 3.4

Kerosine
Range, °F.: 360-500
Gravity, °API: 42.2
Yield, vol %: 21.09
Sulfur, wt %: 0.08
Mercaptan sulfur, vol %: 0.0004
Doctor: sweet
Smoke pt., mm: 22
Aniline pt., °F.: 163
Diesel index: 68.8
Pour pt., °F.: −60
W&N factor: 11.9
Vis., cSt @ 100° F.: 1.95

Light gas oil
Range, °F.: 500-700
Gravity, °API: 33.0
Yield, vol %: 22.04
Aniline pt., °F.: 182
Diesel index: 60.1
Pour pt., °F.: 30
Carbon residue, Rams., wt %: 0.08
Sulfur, wt %: 0.33
W&N factor: 11.9
Vis. cSt @ 100° F.: 7.16
Vis. cSt @ 210° F.: 2.04
Viscosity index: 82.4
Refractive index @ 67° C.: 1.4604
Basic nitrogen, wt %: 0.0081
Bromine No.: 5.7
V/Fe/Ni, ppm: 0.05/0.05/0.05

Atmospheric residuum
Range, °F.: 700+
Gravity, °API: 15.1
Yield, vol %: 39.89
Pour pt., °F.: 100
Carbon residue, Rams, wt %: 9.91
Sulfur, wt %: 0.84
W&N factor: 11.7
Vis., cSt @ 100° F.: 3,700.0
Vis., cSt @ 210° F.: 61.03
Viscosity index: 22.5

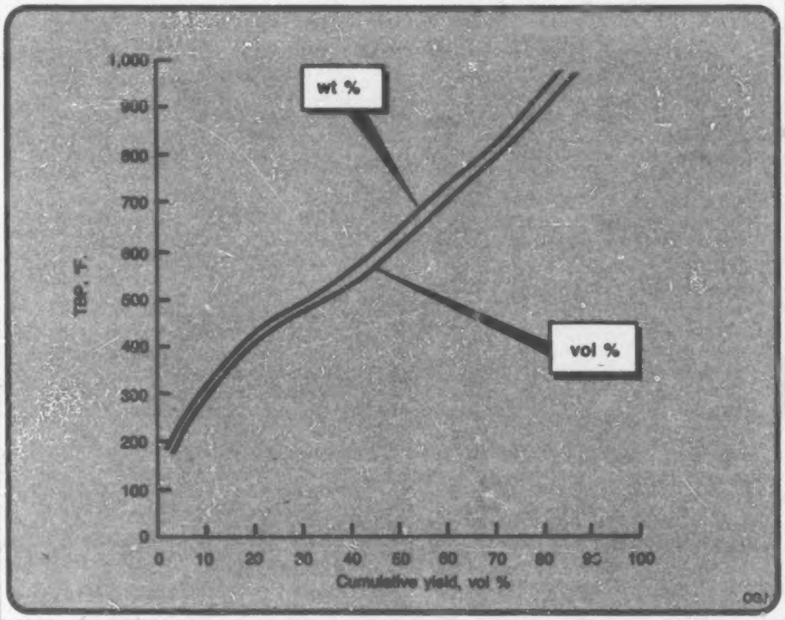
Vacuum gas oil
Range, °F.: 700-800
Gravity, °API: 26.5
Yield, vol %: 3.16
Aniline pt., °F.: 200
Diesel index: 53.0
Pour pt., °F.: 90
Carbon residue, Rams., wt %: 0.32
Sulfur, wt %: 0.52
W&N factor: 12.0
Vis., cSt @ 100° F.: 34.00
Vis., cSt @ 210° F.: 4.83
Viscosity index: 49.6
Refractive index @ 67° C.: 1.4766
Basic nitrogen, wt %: 0.0225
Bromine No.: 6.8
V/Fe/Ni, ppm: 0.05/0.20/1.40

Vacuum gas oil
Range, °F.: 800-1,000
Gravity, °API: 24.1
Yield, vol %: 15.01
Aniline pt., °F.: 210
Diesel index: 50.6
Pour pt., °F.: 105
Carbon residue, Rams, wt %: 0.44
Sulfur, wt %: 0.54
W&N factor: 12.0
Vis., cSt @ 100° F.: 65.00
Vis., cSt @ 210° F.: 6.72
Viscosity index: 43.1
Refractive index @ 67° C.: 1.4837
Basic nitrogen, wt %: 0.0289
Bromine No.: 10.0
V/Fe/Ni, ppm: 0.05/0.05/0.70

Vacuum residuum
Range, °F.: 1,000 +
Gravity, °API: 8.1
Yield, vol %: 21.74
Carbon residue, Rams., wt %: 19.26
Sulfur, wt %: 1.10
V/Fe/Ni, ppm: 41.5/12.00/95.00

Fig. 1

Cano Limon crude oil distillation



Two high-quality onshore crude oils, Sharjah

Richard A. Corbett
Refining Editor

Two northern U.A.E. condensates are actually considered high-quality crude oils. Both have respectable yields in the gas-oil range. Sharjah Condensate is produced from the Saaja gas/condensate field in Sharjah, U.A.E. Initial production, which began in mid-1982, is now 60,000 b/d.

The condensate is transported to the Hamriyah terminal through a 20-mile, 12-in. pipeline. From the terminal, the condensate travels through a 30-in. pipeline to a single point mooring (SPM) buoy in the Persion Gulf. The SPM can handle 250,000 dwt tankers.

Margham Light is produced in Dubai. Production from the Margham gas/condensate field, discovered in 1982, is presently 25,000 b/d. The condensate moves by pipeline to the new Port of Jebal Ali outside Dubai which can handle very large crude tankers. Information regarding these assays, and previous assays in the series, is in OGJ, Apr. 11, 1983.

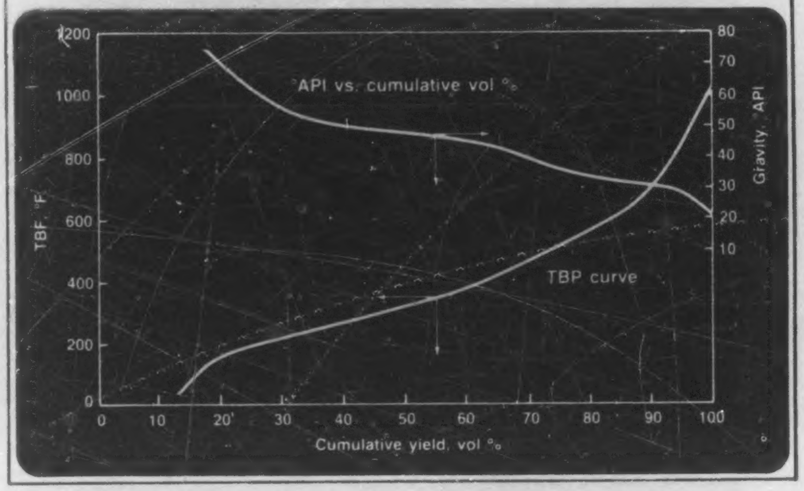
Sharjah Condensate, Sharjah, U.A.E.

Hamriyah terminal to SPM in Persian Gulf

Crude
Gravity, °API: 49.7
Sp gr, 60° F.: 0.7809
Sulfur, wt %: 0.10
Rvp, psi: 10.2
Pour pt., °F.: −25
Nuet no., mg KOH/g: 0.01
Rams. car., wt %: 0.1
Kin. vis., cst @ 68° F.: 1.44
@ 100° F.: 0.96
V/Ni/Fe, ppm: 0/0/0

Gasoline
Range, °F.: C_5 - 200
Yield, vol %: 21.9
Gravity, °API: 72.8
Sulfur, wt %: 0.024
Rvp, psi: 10.7
Charac. factor 12.16
P/N/A, vol %: 78.4/14.4/7.2
RONC: 73.7
MONC: 72.3

Sharjah condensate



Naphtha
Range, °F.: 200-320
Yield, vol %: 22.3
Gravity, °API: 50.9
Sulfur, wt %: 0.008
Rvp, psi: 1.2
Charac. factor: 11.51
P/N/A, vol %: 55.9/21.5/22.6
RONC: 61.6
MONC: 60.0

Heavy naphtha
Range, °F.: 320-400
Yield, vol %: 11.6
Gravity, °API: 46.8
Sulfur, wt %: 0.006
Charac. factor: 11.76
Aromatics, vol %: 27.2
Aniline pt., °F.: 124.9
Diesel index: 58.4
Cetane index: 36.9
Freeze pt., °F.: −74
Smoke pt., mm: 22

Kerosine
Range, °F.: 320-520
Yield, vol %: 25.8
Gravity, °API: 42.2
Sulfur, wt %: 0.032
Rvp, psi: 11.69
Aromatics, vol %: 33.4
Aniline pt., °F.: 137.5
Diesel index: 58.0
Cetane index: 40.3
Freeze pt., °F.: −53
Cloud pt., °F.: −64
Pour pt., °F.: −67
Smoke pt., mm: 20
Nuet. no., mg KOH/g: 0.03
Vis., SUS @ 68° F.: 31.8

Diesel
Range, °F.: 520-650
Yield, vol %: 10.9
Gravity, °API: 33.8
Sulfur, wt %: 0.266
Charac. factor: 11.75
Aniline pt., °F.: 166.4
Diesel index: 56.2
Cetane index: 49.5
Cloud pt., °F.: 24
Pour pt., °F.: 21
Nitrogen, wt %: 0.006
Nuet. no., mg KOH/g: 0.05
Vis., SUS @ 68° F.: 44.8
@ 122° F.: 36.3

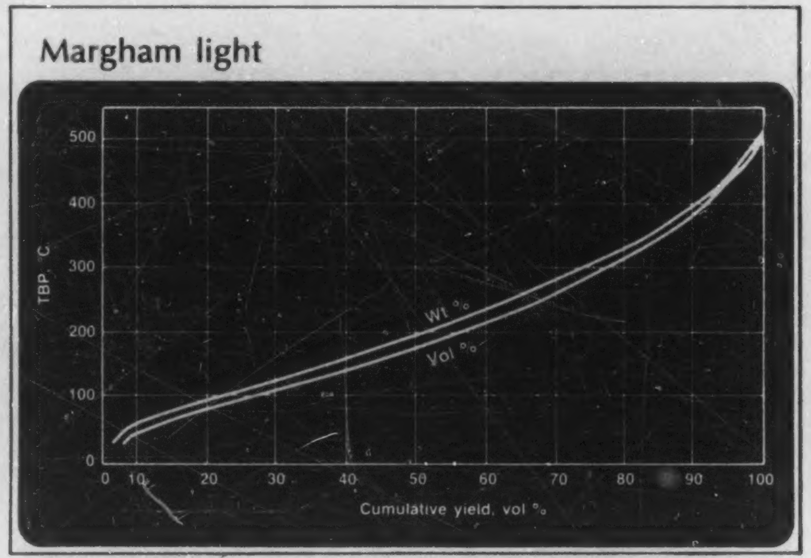
Gas oil
Range, °F.: 650-850
Yield, vol %: 9.1
Gravity, °API: 29.7
Sulfur, wt %: 0.392
Charac. factor: 11.95
Pour pt., °F.: 80
Nitrogen, wt %: 0.030
Nuet. no., mg KOH/g: 0.09
Rams. Car., wt %: 0.01
Vis., SUS @ 122° F.: 58.9
@ 210° F.: 38.0

Residuum
Range, °F.: 650+
Yield, vol %: 13.3
Gravity, °API: 27.8
Sulfur, wt %: 0.413
Pour pt., °F.: 89
Nitrogen, wt %: 0.046
Rams. car., wt %: 0.52
Vis., SUS @ 122° F.: 75.2
@ 210° F.: 42.8
V/Fe ppm: 1/1

Residuum
Range, °F.: 850+
Yield, vol %: 4.2
Gravity, °API: 23.8
Sulfur, wt %: 0.457
Pour pt., °F.: 122

Condensate and Margham Light, are assayed

Margham light



Nitrogen, wt %: 0.079
Rams. car., wt %: 1.57
Vis., SUS @ 122° F.: 281
@ 210° F.: 70.9
V/Fe, ppm: 2/2

Margham Light, Dubai, U.A.E.

Port of Jebal Ali

Crude
Gravity, °API: 50.33
Vis. cSt @ 20° C.: 1.49
Pour pt., °C.: −8
Rvp psi: 9.8
Salt, mg/l: 4
Water, wt %: 0.008
Water, vol %: < 0.01
H_2S, ppm: <5
Neut. no., mg KOH/g: <0.01
Sediment, wt %: <0.01
Sulfur, wt %: 0.04
Wax content, wt %: 4.04
Con. carbon, wt %: 0.03
Ash, wt %: <0.01
Asphaltenes, wt %: 0.05
Calorific value, BTU/lb: 20207
V/Ni/Na, ppm: <0.1/<0.1/0.4

Light naptha
Range, °C.: IBP-75
Yield, vol %: 12.88
Gravity, °API: 81.30
Sulfur, wt %: 0.02
Mercaptan sulfur, ppm: <5
Paraffins, wt %: 81.6
Naphthenes, wt %: 10.9
Aromatics, wt %: 7.5
Olefins, vol.%: 0.6

Naphtha
Range, °C.: 75-165
Yield, vol %: 29.64
Gravity, °API: 53.15
Sulfur, wt %: 0.01
Mercaptan sulfur, ppm: <5
Paraffins, wt %: 45.1
Naphthenes, wt %: 25.0
Aromatics, wt %: 29.9
Olefins, vol %: 1.0

Kerosine
Range, °C.: 165-235
Yield, vol %: 16.89
Gravity, °API: 44.52
Sulfur, wt %: 0.02
Smoke pt., mm: 22
Freeze pt °C.: −53
Aromatics, vol %: 20.4
Flash pt °C.: 61
Copper strip corrosion: 1a
Existent gum, mg/100 ml: 1
Neut. no., mg KOH/g: <0.01

Diesel
Range, °C.: 235-300
Yield, vol %: 13.34
Gravity, °API: 37.22
Sulfur, wt %: 0.02
Cetane index: 51
Pour pt. °C.: −26
Cloud pt. °C.: −23
Cold filter plug pt. °C.: −25
Kin. cSt @ 37.8° C.: 2.79
Kin. cSt @ 50° C.: 2.22
Neut. no., mg KOH/g: <0.01
Con. carbon, 10% bott., wt %: 0.04
Flash pt., °C.: 113
Copper strip corrosion: 1a
Aniline pt. °C.: 70.6
Nitrogen, wt %: <0.01

Diesel
Range, °C.: 300-350
Yield, vol %: 7.25
Gravity, °API: 36.66
Sulfur, wt %: 0.27
Cetane index: 58
Pour pt. °C.: 1
Cloud pt. °C.: 3
Cold filter plug pt. °C.: 1
Kin. cSt @ 37.8° C.: 6.00
Kin. cSt @ 50° C.: 4.40
Neut. no., mg KOH/g: <0.01
Con. carbon, 10% bott., wt %: 0.73
Flash pt., °C.: 159
Copper strip corrosion: 1a
Nitrogen, wt %: <0.01

Gas oil*
Range, °C.: 350-370
Yield, vol %: 2.63
Gravity, °API: 34.18
Sulfur, wt %: 0.25
Cloud pt., °C.: 26
*Insufficient sample for complete analysis of this fraction.

Heavy gas oil
Range, °C.: 350-514.3
Yield, vol %: 13.78
Gravity, °API: 32.04
Sulfur,wt %: 0.18
Kin. cSt @ 37.8° C.: 22.5
@ 50° C.: 14.6
@ 82.2° C.: 6.05
@ 100° C.: 4.26
Pour pt., °C.: 36
Asphaltenes, wt %: <0.05
Con. carbon, wt %: <0.01
V/Ni, mg/kg: <0.1/0.2
Neut. no., mg KOH/g: 0.05
UOP K: 12.40
Nitrogen, wt %: <0.01
Aniline pt., °C.: 103.1
Wax, wt %: 17.2
Ash, wt %: <0.01
Sediment, wt %: <0.01

Residue
Range, °C.: 350+
Yield, vol %: 13.98
Gravity, °API: 31.73
Sulfur, wt %: 0.17
Kin. cSt @ 37.8° C.: 25.2
@ 50° C.: 14.9
@ 82.2° C.: 6.51
@ 100° C.: 4.58
Pour pt., °C.: 32
Asphaltenes, wt %: <0.05
Con. carbon, wt %: 0.04
V/Ni, mg/kg: <0.1/0.9
Neut. no., mg KOH/g: 0.15
Nitrogen, wt %: 0.02
Aniline pt., °C.: 102.4
Wax, wt %: 20.3
Ash, wt %: 0.01
Sediment, wt %: <0.01

AILLEEN CANTRELL
Director of Editorial Surveys
The Oil & Gas Journal

1987 Worldwide Petrochemical Survey

ABU DHABI

RUWAIS FERTILIZER INDUSTRIES

Ruwais. Feed: feedstock gas. Products: ammonia (1,000 mt/d), urea (1,500 mt/d).

ALGERIA

SONATRACH

Arzew. Feed: natural gas. Products: ammonia (1,000 mt/d), aromatics mix (1,152 mt/d), benzene (273 mt/d), ethylene (364 mt/d), formaldehyde (61 mt/d), methanol (303 mt/d), orthoxylene (115 mt/d), ld polyethylene (145 mt/d), polyvinyl chloride (106 mt/d), toluene (5,000 mt/d), urea (400 mt/d), xylene mix (748 mt/d).

ARGENTINA

ATANOR

Baradero, Buenos Aires. Feed: ethyl alcohol. Products: acetaldehyde (5,345 mt/y), acetic acid (7,060 mt/y), acetic anhydride (2,140 mt/y), acetates (12,600 mt/y).

Munro, Buenos Aires. Feed: acetates, ethyl alcohol, methanol. Products: acetaldehyde (2,405 mt/y), acetic acid (3,210 mt/y), acetone (1,400 mt/y), ethanol (11,200 mt/y), formaldehyde (25,680 mt/y).

Río Tercero, Córdoba. Feed: ethyl alcohol, natural gas. Products: acetaldehyde (3,250 mt/y), acetic acid (4,280 mt/y), methanol (12,880 mt/y).

CARBOCLOR INDUSTRIAS QUIMICAS

Campana. Feed: C_3 and C_4 refinery cuts. Products: acetone (12,000 mt/y), isopropanol (42,000 mt/y).

CASCO SAIC

Pilar. Feed: methanol, natural gas. Products: formaldehyde (38,000 mt/y), methanol (20,000 mt/y).

DIRECCION GENERAL DE FABRICACIONES MILITARES

Campana. Feed: hydrocarbon fractions. Products: aromatics mix, normal paraffins, toluene, xylene mix, solvents.

Rio Tercero, Cordoba. Feed: natural gas. Product: ammonia (12,000 mt/y).

DUPERIAL SAIC

(subsidiary of Imperial Chemical Industries)

San Lorenzo. Feed: sulfur, natural gas, naphtha, orthoxylene, ethylene, phthalic anhydride, alcohols. Products: carbon bisulfide (14,000 mt/y), ethylene (15,000 mt/y), phthalic anhydride (12,400 mt/y), ld polyethylene (20,000 mt/y), plasticizers (18,000 mt/y), propylene-butadiene (6,000 mt/y).

ELECTROCLOR SAIC

Capitán Bermúdez, Santa Fe. Feed: calcium carbide, chlorine, hydrogen. Products: acetylene (15,000 mt/y), ammonia (3,000 mt/y), polyvinyl chloride (32,000 mt/y).

IPAKO-Industrias Petroquimicas Argentinas

(owned by private Argentine interests).

Ensenada. Feed: refinery gases. Products: ethylene (15,000 mt/y), ld polyethylene (14,000 mt/y).

MALEIC SA

Ensenada, Buenos Aires. Feed: n-butane. Product: maleic anhydride (7,200 mt/y).

MONSANTO ARGENTINA SAIC

Zarate. Feed: styrene. Products: ABS-polystyrene (24,000 mt/y).

PASA PETROQUIMICA ARGENTINA

(owned by Amcorp SA, Anglo American Corp., Argentina Holdings Ltd., Uniroyal Chemical CI, Vista Chemical Co.)

Pto. Gral. San Martin, Santa Fe. Feed: butane, naphtha, propane. Products: aromatics (180,000 mt/y), butadiene (33,000 mt/y), ethylbenzene (65,000 mt/y), ethylene (23,000 mt/y), styrene (54,000 mt/y), SBR (50,000 mt/y).

PETROQUIMICA BAHÍA BLANCA SAIC

Bahía Blanca. Feed: ethane. Products: ethylene (201,000 mt/y).

PETROQUIMICA GENERAL MOSCONI

Ensenada, Buenos Aires. Feed: naphtha. Products: benzene (84,000 mt/y), cyclohexane (42,000 mt/y), orthoxylene (23,000 mt/y), paraxylene (35,000 mt/y), toluene (33,000 mt/y), xylene mix (9,000 mt/y).

PETROSUR SAIC

Campana. Feed: natural gas. Products: ammonia (210 mt/d), urea (300 mt/d).

POLISUR

Bahía Blanca. Feed: ethylene. Product: ld polyethylene (190,000 mt/y).

SUDAMTEX SA

Azul, Buenos Aires. Feed: dimethyl terephthalate, ethylene glycol. Products: methanol (1,650 mt/y), polyester (6,500 mt/y).

AUSTRALIA

AFL HOLDINGS LTD.

Gibson Island, Queensland. Feed: natural gas. Products: ammonia (237,000 mt/y), urea (245,000 mt/y).

Newcastle, NSW. Feed: natural gas. Product: ammonia (238,000 mt/y).

ALTONA PETROCHEMICAL CL

(50% Esso Australia Ltd., 50% Mobil Oil Australia).

Altona, Vic. Feed: gas oil, ethane. Products: butadiene (17,000 mt/y), ethylene (170,000 mt/y), propylene (50,000 mt/y).

AMPOL REFINERIES LTD.

Lytton, Brisbane. Feed. kerosine, naphtha, reformate. Product: toluene (1,200 mt/y), solvents (4,700 mt/y).

AUSTRALIAN CARBON BLACK PL

(100% Cabot Corp.)

Altona, Vic. Feed: petroleum residual. Product: carbon black (58,000 mt/y).

AUSTRALIAN SYNTHETIC RUBBER CL

(35% Esso Australia Ltd., 35% Mobil Oil Australia Ltd., 30% Goodyear Tire & Rubber CL).

Altona. Feed: butadiene, styrene. Products: polybutadiene (10,000 mt/y), SBR (35,000 mt/y).

BORDEN AUSTRALIA PL

Brisbane, Gibson Island. Feed: methanol. Products: formaldehyde (23,000 mt/y).

Melbourne. Feed: methanol. Products: formaldehyde (23,000 mt/y).

COMPOL LTD.

(50% Mobil, 50% Exxon).

Altona, Vic. Feed: ethylene. Products: polyethylene (102,000 mt/y).

CONTINENTAL CARBON AUSTRALIA PL

(49% affiliate of Witco Corp.—Concarb Div.)

Kurnell, NSW. Feed: creosote oil, FCC bottoms, ethylene tars. Product: carbon black (25,000 mt/y).

HOECHST AUSTRALIA LTD.

(owned 95% by Hoechst AG).

Altona. Feed: olefins. Products: hd polyethylene (50,000 mt/y), polypropylene (35,000 mt/y).

ICI AUSTRALIA LTD.

Botany, NSW. Feed: LPG, light naphtha. Products: butadiene (23,000 mt/y), butylenes (23,000 mt/y), ethylene (250,000 mt/y), ethylene oxide (30,000 mt/y), ld polyethylene (90,000 mt/y), polypropylene (55,000 mt/y), propylene (95,000 mt/y), polyvinyl chloride (56,000 mt/y), vinyl chloride (60,000 mt/y).

Laverton, Vic. Feed: vinyl chloride. Product: polyvinyl chloride (50,000 mt/y).

Rhodes. Feed: ethylene, heptene, natural gas, naphthalene, propylene. Products: acetaldehyde (15,000 mt/y), acetic acid (18,500 mt/y), acetic anhydride (3,000 mt/y), butanols (9,500 mt/y), isooctanol (14,000 mt/y), phthalic anhydride (21,500 mt/y), vinyl acetate (13,000 mt/y), solvents (9,500 mt/y), plasticizers (32,500 mt/y).

KWINANA NITROGEN CPL

Kwinana. Feed: refinery offgases. Product: ammonia (305 mt/d).

MONSANTO AUSTRALIA LTD.

West Footscray. Feed: benzene, ethane, propylene. Products: acetone, ethylene, phenol, polyester, polystyrene, styrene, ABS, SBR.

SHELL CHEMICAL (AUSTRALIA) PL

Clyde, N.S.W. Feed: refinery gases. Products: polypropylene (34,000 mt/y).

Geelong, Victoria. Feed: naphtha, gasoline, refinery gases. Products: alkylbenzene,-toluene,-xylene mix,-solvents (90,000 mt/y), polypropylene (50,000 mt/y).

AUSTRIA

CHEMIE LINZ AG

Enns. Feed: propylene. Product: acrylonitrile (75,000 mt/y).

Linz. Feed: natural gas, benzene, orthoxylene. Products: acrylonitrile, ammonia (500,000 mt/y), maleic anhydride (19,000 mt/y), melamine (35,000 mt/y), phthalic anhydride (35,000 mt/y), urea (400,000 mt/y), plasticizers (43,000 mt/y).

HALVIC KUNSTOFFWERKE GmbH

Hallein. Feed: vinyl chloride monomer. Product: polyvinyl chloride.

ÖMV AG

Schwechat. Feed: butane, gasoil, naphtha. Products: butadiene (50,000 mt/y), ethylene (320,000 mt/y), propylene (160,000 mt/y).

PETROCHEMIE DANUBIA GmbH

(100% OMV AG)

Schwechat. Feed: ethylene, propylene. Product: phthalic anhydride (35,000 mt/y), polyethylene (300,000 mt/y), polypropylene (200,000 mt/y).

VIANOVA KUNSTHARZ AG

Werndorf. Feed: alcohols, acids, oils. Products: acrylics and alkyds, unsaturated polyesters, water soluble resins (45,000 mt/y).

BAHRAIN

GULF PETROCHEMICAL INDUSTRIES CO.

Manama. Feed: methane. Products: ammonia (330,000 mt/y), methanol (330,000 mt/y).

BANGLADESH

ZIA FERTILIZER CL

(Bangladesh Chemical Industries Corp.)

Ashuganj. Feed: natural gas. Products: ammonia (930 mt/d), urea (1,600 mt/d).

BELGIUM

AMOCO CHEMICAL CO.

Geel. Feed: metaxylene, methanol, paraxylene, propylene. Products: dimethyl terephthalate (61,000 mt/y), isophthalic acid (37,000 mt/y), polypropylene (160,000 mt/y), terephthalic acid (90,000 mt/y).

BASF ANTWERPEN NV

Antwerp. Feed: ethylene, benzene, cyclohexane, vinyl chloride. Products: caprolactam (150,000 mt/y), ethylene glycol (160,000 mt/y), ethylene oxide (150,000 mt/y), polystyrene (145,000 mt/y), polyvinyl chloride (80,000 mt/y), vinyl chloride (160,000 mt/y).

BAYER ANTWERPEN NV

Antwerp and Kallo. Feed: cyclohexane. Products: caprolactam (100,000 mt/y), polyamid 6 (10,000 mt/y).

BP CHEMICALS BELGIUM

Antwerp. Products: glycols (130,000 mt/y), ethylene oxide (113,000 mt/y), ld polyethylene (135,000 mt/y), esters-ethers (75,000 mt/y).

DOW CHEMICAL

Tessenderlo. Products: polystyrene, hd polyethylene.

DSM

Limburgse Vinyl Mij

Tessenderlo. Feed: ethylene, C12 HCl. Product: vinyl chloride (450,000 mt/y).

EXXON CHEMICAL BELGIUM

Antwerp. Feed: ethylene, hydrocarbons. Products: polyethylene (250,000 mt/y), solvents (550,000 mt/y).

Meerhout. Feed: ethylene. Product: polyethylene (250,000 mt/y).

KEMIRA SA.

Tertre. Feed: natural gas. Product: ammonia (300,000 mt/y).

MONTEFINA.

(50% Himont Italia, 50% Petrofina)

Feluy. Feed: propylene, styrene. Products: polypropylene (240,000 mt/y), polystyrene (70,000 mt/y), expandable polystyrene (30,000 mt/y).

NESTE POLYPROPYLENE NV

Beringen. Feed: propylene. Product: polypropylene (120,000 mt/y).

PHILLIPS 66 CO.

Tessenderlo. Feed: olefins. Product: petrosulfur compounds (13,100 mt/y).

POLYSAR BELGIUM NV

Antwerp. Feed: isobutylene. Products: butyl rubber (85,000 mt/y).

SOLVIC SA

Jemeppe-sur-Sambre. Feed: ethylene. Products: vinyl chloride, polyvinyl chloride.

UCB-FTAL

Ostend. Feed: alcohols, cyclohexanol, orthoxylene, phenol. Products: maleic anhydride (3,600 mt/y), phthalic anhydride (80,000 mt/y), phthalates (65,000 mt/y).

BRAZIL

ALBA AMAZÓNIA SA

Manaus. Feed: methanol. Product: formaldehyde (30,000 mt/y).

ALBA NORDESTE SA

Abreu e Lima. Feed: methanol. Product: formaldehyde (8,000 mt/y).

ALBA QUÍMICA SA

Cotia, S.P. Feed: ethanol, methanol. Products: acetaldehyde (7,200 mt/y), formaldehyde (25,200 mt/y).

Cubatão. Feed: methanol, naphtha. Products: formaldehyde (45,400 mt/y), methanol (33,600 mt/y).

Curitiba, P.R. Feed: methanol. Products: formaldehyde (45,400 mt/y).

Serra. Feed: methanol. Product: formaldehyde (29,700 mt/y).

BANN QUÍMICA SA

Ermelino Matarazzo, SP. Feed: aniline. Product: rubber chemicals (12,800 mt/y).

Paulinia, SP. Feed: benzene, naphtha. Product: aniline (6,000 mt/y).

CAPUAVA CARBONOS INDUSTRIAIS SA

Mauá, São Paulo. Feed: ethylene tar. Product: carbon black (57,000 mt/y).

CIA. DE CARBONOS COLOIDAIS

Candeias, Bahía. Feed: heavy aromatic hydrocarbons. Product: carbon black (56,000 mt/y).

CIQUINE—Cia. Indústrias Químicas do Nordeste

Camaçari, Bahía. Feed: benzene, orthoxylene, phthalic anhydride, 2-ethyl hexanol, propylene. Products: maleic anhydride (6,400 mt/y), phthalic anhydride (28,000 mt/y), plasticizers (10,000 mt/y), propylene (38,800 mt/y).

COMPANHIA BRASILEIRA DE ESTIRENO

Cubatão, S.P. Feed: benzene, ethanol, ethylene. Products: ethylene (4,800 mt/y), ethylbenzene (93,000 mt/y), ethylchloride (500 mt/y), styrene (80,000 mt/y), toluene (3,200 mt/y).

CONSÓRCIO PAULISTA DE MONÔMERO SA

Santo André. Feed: ethylene. Product: vinyl chloride (120,000 mt/y).

COPEBRÁS

Cubatão. Feed: heavy aromatic hydrocarbons. Product: furnace carbon black (120,000 mt/y).

COPENE

Camaçari, Bahía. Feed: gas oil, naphtha. Products: aromatics (200,000), benzene (222,000 mt/y), butadiene (79,000 mt/y), butylenes (46,000 mt/y), ethylene (460,000 mt/y), orthoxylene (70,000 mt/y), MTBE (68,000 mt/y), paraxylene (130,000 mt/y), propylene (272,000 mt/y), solvent (45,000 mt/y), toluene (30,000 mt/y), xylene mix (70,000 mt/y).

COPENOR

Camaçari. Feed: methanol. Product: formaldehyde (43,000 mt/y).

COPERBO

Cabo, Pernambuco. Feed: alcohol, butadiene, styrene. Products: acetaldehyde (46,000 mt/y), acetic acid (65,000 mt/y), ethylene (32,000 mt/y), polybutadiene (53,000 mt/y), SBR (23,000 mt/y), vinyl acetate (80,000 mt/y).

COPESUL

Triunfo, RGS. Feed: naphtha. Products: benzene (168,000 mt/y), butadiene (73,000 mt/y), butylenes (48,000 mt/y), ethylene (453,000 mt/y), propylene (241,000 mt/y), toluene (14,000 mt/y), xylene mix (60,000 mt/y).

ESTIRENO DO NORDESTE SA

Camaçari, Bahía. Feed: benzene, ethylene. Products: ethylbenzene (180,000 mt/y), polystyrene (100,000 mt/y), styrene (150,000 mt/y), toluene (800 mt/y).

FISIBA

Camaçari, Bahía. Feed: acrylonitrile. Product: acrylics (1,100 mt/y).

HERCULES INC.

Triunfo. Feed: propylene. Product: polypropylene (50,000 mt/y).

INDÚSTRIAS QUÍMICAS ELETRO CLORO SA

Elclor. Feed: ethylene, vinyl chloride. Products: ethylene (10,500 mt/y), hd polyethylene (82,000 mt/y), polyvinyl chloride (100,000 mt/y), vinyl chloride (34,000 mt/y).

METANOR SA—Metanol do Nordeste

Camaçari, Bahía. Feed: carbon dioxide, natural gas. Product: methanol (70,400 mt/y).

NITRIFLEX SA

Duque de Caxias, Rio de Janeiro. Feed: acrylonitrile, butadiene, styrene. Products: ABS-MBS (21,000 mt/y), resins, rubber (17,000 mt/y).

NITROCARBONO SA

Camaçari. Feed: ammonia, benzene. Products: caprolactam (45,000 mt/y), cyclohexane (48,000 mt/y), polyamide 6 (1,300 mt/y).

NITROFÉRTIL

Camaçari, Bahía. Feed: natural gas. Products: ammonia (1,107 mt/d), urea (1,050 mt/d).

Laranjeiras, Sergipe. Feed: natural gas. Products: ammonia (907 mt/d), urea (1,100 mt/d).

OXITENO SA INDÚSTRIA E COMÉRCIO

Camaçari, Bahía. Feed: ethylene, oxygen. Products: ethylene glycol (122,130 mt/y), ethylene oxide (105,000 mt/y).

Mauá, São Paulo. Feed: ethylene, oxygen. Products: ethylene glycol (25,000 mt/y), ethylene oxide (35,000 mt/y).

PETROFLEX

Duque de Caxias. Feed: butadiene, ethylbenzene, styrene. Products: styrene (60,000 mt/y), SBR (185,000 mt/y).

Triunfo. Feed: benzene, butadiene, ethylene, styrene. Products: ethylbenzene (140,000 mt/y), SBR (40,000 mt/y).

PETROQUÍMICA UNIÃO SA

Santo André, Capuava. Feed: naphtha. Products: alkybenzene (11,500 mt/y), aromatics (311,500 mt/y), benzene (170,000 mt/y), butadiene (50,000 mt/y), butylenes (59,400 mt/y), carbon black feedstock (51,000 mt/y), ethylene (360,000 mt/y), orthoxylene (35,000 mt/y), propylene (204,000 mt/y), resins (10,000 mt/y), toluene (40,000 mt/y), xylene mix (55,000 mt/y).

POLIALDEN PETROQUÍMICA SA

Camaçari, Bahía. Feed: ethylene. Product: hd polyethylene (80,000 mt/y).

POLIBRASIL

Mauá, São Paulo. Feed: propylene. Product: polypropylene (90,000 mt/y).

POLIOLEFINAS SA

Capuava, Santo André. Feed: ethylene, vinyl acetate. Product: ethylene-vinyl acetate copolymer and ld polyethylene (110,000 mt/y).

Triunfo, Rio Grande do Sul. Feed: ethylene. Product: ld polyethylene (160,000 mt/y).

POLISUL PETROQUIMICA SA
(40% Hoechst AG)
Triunfo. Feed: ethylene. Product: hd polyethylene (90,000 mt/y).

POLITENO
Camaçari, Bahia. Feed: ethylene, vinyl acetate. Product: ld polyethylene (130,000 mt/y).

PRONOR PETROQUÍMICA SA
Camaçari. Feed: methanol, natural gas, paraxylene, toluene. Products: dimethyl terephthalate (78,800 mt/y), toluene diisocyanate (30,800 mt/y).

RHÓDIA SA
Paulínia. Feed: alcohol, cumene, paraxylene. Products: acetaldehyde (58,500 mt/y), acetic acid (73,000 mt/y), acetone (62,420 mt/y), bisphenol A (17,160 mt/y), butanol (6,000 mt/y), cyclohexane (400 mt/y), isopropanol (7,700 mt/y), phenol (105,000 mt/y), terephthalic acid (90,000 mt/y-produced by Rhodiaco), vinyl acetate (29,000 mt/y).
Santo André. Feed: alcohol, cumene, paraxylene. Products: acetic anhydride (26,000 mt/y), nylons (55,900 mt/y), polybutylene (74,000 mt/y-includes 32,000 mt/y from Cidade de Cabo plant).

SALGEMA SA
Maceió, Alagoas. Feed: ethanol. Product: ethylene (100,000 mt/y).

ULTRAFÉRTIL SA
Araucária. Feed: anhydrous ammonia, asphaltic residue, syngas. Product: ammonia (396,000 mt/y), methanol (7,920 mt/y), urea (495,000 mt/y).
Cubatão. Feed: refinery off gases. Product: ammonia (30,000 mt/y).
Plaçaguera. Feed: naphtha, refinery off gases. Product: ammonia (149,820 mt/y).

UNION CARBIDE DO BRASIL LTDA.
Cubatão, São Paulo. Feed: ethylene. Products: ld polyethylene (128,000 mt/y).

USIMINAS SA
(Usinas Siderúrgicas de Minas Gerais)
Ipatinga. Feed: coke oven gas, coal tar. Products: ammonia (12.3 t/d), benzene (33.3 t/d), naphthalene (19 t/d), toluene (5.3 t/d), xylene mix (0.7 t/d).

CANADA

ALBERTA GAS CHEMICALS LTD.
(50% Nova, 50% Carma Developers Ltd.)
Medicine Hat, Alberta. Feed: natural gas. Product: methanol (2,400 mt/d).

ALBERTA GAS ETHYLENE CL
Joffre, Alberta. Feed: ethane. Products: butadiene (51,000 mt/y), ethylene (1,224,000 mt/y), propylene (35,000 mt/y).

BASF CANADA INC.
Cornwall, Ontario. Feed: orthoxylene. Products: phthalic anhydride (30,000 mt/y), plasticizers (25,000 mt/y).

BORDEN CHEMICAL CANADA
Laval, Quebec. Feed: methanol. Product: formaldehyde (25,000 mt/y).
Edmonton, Alberta. Feed: methanol. Product: formaldehyde (35,000 mt/y).

BORG-WARNER (CANADA) LTD.
Coburg, Ont. Product: ABS (20,000 mt/y).

CABOT CANADA LTD.
Sarnia, Ont. Feed: heavy fuel oil. Product: carbon black (80,000 mt/y).

CANADIAN FERTILIZERS LTD.
Medicine Hat, Alta. Feed: natural gas. Product: ammonia (800,000 mt/y), urea (545,000 mt/y).

CANCARB LTD.
Medicine Hat, Alta. Feed: natural gas. Product: carbon black (30,000 mt/y).

CELANESE CANADA LTD.
Clover Bar (near Edmonton). Feed: butanes, ethylene, natural gas. Products: acetaldehyde (1,700 mt/y), acetic acid (72,000 mt/y), acetic anhydride (27,000 mt/y), acetone (1,700 mt/y), formaldehyde (38,000 mt/y), methanol (750,000 mt/y), vinyl acetate (52,000 mt/y).

C-I-L INC.
Courtright, Ont. Feed: natural gas. Product: ammonia (720,000 mt/y), urea (140,000 mt/y).
Edmonton, Alta. Feed: ethylene. Product: ld polyethylene, ethylene vinyl acetate (75,000 mt/y).

COLUMBIAN CHEMICALS CO.
Hamilton, Ont. Feed: heavy aromatic hydrocarbons. Product: furnace carbon black (70,000 mt/y).

COMINCO LTD.
Calgary, Alta. Feed: natural gas. Product: ammonia (110,000 mt/y).
Carseland, Alta. Feed: natural gas. Product: ammonia (410,000 mt/y), urea (480,000 mt/y).
Trail, B.C. Feed: natural gas. Product: ammonia (66,000 mt/y).

COMMERCIAL ALCOHOLS LTD.
Varennes, Que. Feed: ethylene. Product: ethanol (55,000 mt/y).

CYANAMID CANADA INC.
Niagara Falls, Ont. Feed: natural gas. Products: ammonia (220,000 mt/y), urea (91,000 mt/y).

DOW CHEMICAL OF CANADA INC.
Fort Saskatchewan, Alta. Feed: ammonia, caustic, chlorine, ethylene, hydrogen, natural gas, oxygen. Products: ethanolamines, ethylene dichloride, ethylene glycol, ethylene oxide, lld polyethylene, vinyl chloride.
Sarnia, Ont. Feed: benzene, butadiene, caustic, chlorine, ethylene, hydrogen, natural gas, propylene. Products: ethylbenzene, ld and hd polyethylene, polystyrene, propylene glycol, propylene oxide, styrene, vinyl chloride, SB latex.
Varennes, Que. Feed: butadiene, styrene. Product: SB latex.

DU PONT CANADA INC.
Corunna, Ont. Feed: ethylene. Product: ld & hd polyethylene (235,000 mt/y).

ESSO CHEMICAL CANADA
(Division of Imperial Oil)
Ioco, B.C. Feed: naphtha. Product: xylene (7,000 mt/y).
Redwater, Alberta. Feed: natural gas. Products: ammonia (825,000 mt/y), urea (525,000 mt/y).
Sarnia, Ontario. Feed: natural gas liquids. Products: benzene (100,000 mt/y), butadiene (8,000 mt/y), butylenes (4,000 mt/y), carbon black (65,005 mt/y), ethylene (220,000 mt/y), polyethylene (135,000 mt/y), polyvinyl chloride (90,000 mt/y), propylene (40,000 mt/y), toluene-xylene (140,000 mt/y).

ETHYL CANADA INC.
Corunna, Ont. Feed: ethylene. Products: ethyl chloride (36,000 mt/y).

B.F. GOODRICH CANADA INC.
Niagara Falls, Ont. Product: polyvinyl chloride resins (110,000 t/y).
Shawinigan, Quebec. Product: polyvinyl chloride resins (55,000 t/y).

HIMONT CANADA INC.
Varennes, Quebec. Feed: propylene. Product: polypropylene (70,000 mt/y).

NITROCHEM INC.
Maitland, Ontario. Feed: natural gas. Products: ammonia (80,000 mt/y).

NOVACOR CHEMICALS LTD.
Joffre, Alberta. Feed: ethylene. Product: ld polyethylene (340,000 mt/y).
Sarnia, Ont. Feed: ethylene. Products: ld-hd polyethylene (180,000 mt/y).

OCELOT AMMONIA CO.
Kitimat, B.C. Feed: natural gas, hydrogen. Products: ammonia (550 mt/d), methanol (1,250 mt/d).

PETRO-CANADA PRODUCTS
Montreal. Feed: crude oil. Products: benzene (150,000 mt/y), normal paraffins (25,000 mt/y), toluene (150,000 mt/y), xylene mix (150,000 mt/y).

POLYSAR LTD.
Cambridge, Ont. Feed: styrene. Product: polystyrene (37,000 mt/y).
Corunna, Ont. Feed: heavy atm. gas oil, vac gas oil, naphtha from crude and condensate, NGLS. Products: aromatics mix (125,000 mt/y), benzene (140,000 mt/y), butadiene (90,000 mt/y), butylenes (130,000 mt/y), ethylene (455,000 mt/y), propylene (330,000 mt/y).
Montreal. Feed: styrene. Product: polystyrene (38,000 mt/y).
Sarnia, Ont. Feed: acrylonitrile, benzene, C_4 streams, ethylene, ethylbenzene, light oil. Products: styrene (270,000 mt/y), SBR-NBR-BR-IIR (262,000 mt/y), toluene (13,000 mt/y).

RECOCHEM INC.
Napierville, Que. Products: benzene (20,000 mt/y), naphthalene (25,000 mt/y), toluene, xylene.

REICHHOLD LTD.
North Bay, Ont. Feed: methanol. Product: formaldehyde (100,000 mt/y).
Port Moody, B.C. Feed: methanol. Product: formaldehyde (15,500 mt/y).
Ste. Therese, Que. Feed: methanol. Product: formaldehyde (15,500 mt/y).
Thunder Bay, Ont. Feed: methanol. Products: formaldehyde (55,000 mt/y).

SHELL CANADA LTD.
Corunna, Ont. Feed: reformate, propylene. Products: benzene (65,000 mt/y), isopropanol (91,000 mt/y), polypropylene (80,000 mt/y), toluene (60,000 mt/y), xylene mix (60,000 mt/y).
Montreal East, Que. Feed: isopropyl alcohol. Product: acetone, C_6, chemical solvents (27,000 mt/y).
Scotford, Alta. Feed: benzene, ethylene. Product: styrene (300,000 mt/y).

SHERRITT GORDON MINES LTD.
Fort Saskatchewan, Alta. Feed: natural gas. Products: ammonia (490,000 mt/y), urea (393,000 mt/y).

SIMPLOT CHEMICAL CL
Brandon, Man. Feed: natural gas. Products: ammonia (550 mt/d), urea (480 mt/d).

SUNOCO INC.
Sarnia. Feed: reformate. Products: benzene (48,000 mt/y), orthoxylene (35,000 mt/y), toluene (180,000 mt/y), xylene mix (140,000 mt/y).

UNION CARBIDE CANADA LTD.
Montreal East, Que. Feed: ethylene. Products: ethylene glycol (82,000 mt/y), ethylene oxide (80,000 m/ty).
Red Deer, Alta. Product: ethylene glycol (250 mt/d).

WESTERN CO-OPERATIVE FERTILIZERS LTD.
Calgary, Alta. Feed: natural gas. Products: ammonia (60,000 mt/y).
Medicine Hat, Alta. Feed: natural gas. Product: ammonia (60,000 mt/y).

CHILE

PETROX SA
Talcahuano. Feed: naphtha. Product: ethylene (60,000 mt/y).

CHINA, TAIWAN

CHANG CHUN PETROCHEMICAL CL

Miaoli. Feed: acetic acid, n-isobutanol. Products: acetic acid (36,000 mt/y), acrylics (4,000 mt/y), n-isobutyl acetate (24,000 mt/y), formaldehyde (25,000 mt/y), polyvinyl alcohol (36,000 mt/y), polyvinyl butyral (1,000 mt/y).

CHANG CHUN PLASTICS CL

Kaohsiung. Feed: methanol, phenol, urea. Products: formaldehyde (33,000 mt/y), polyacrylamide (10,000 mt/y), polyester (2,500 mt/y).

Shin-Tsu. Feed: methanol, phenol. Product: formaldehyde (50,000 mt/y), resins (36,400 mt/y).

CHINA AMERICAN PETROCHEMICAL CL

Lin Yuan. Feed: PTA. Product: terephthalic acid (475,000 mt/y).

CHINA PETROCHEMICAL DEVELOPMENT CORP.

Kaohsiung. Feed: cyclohexane, oleum. Products: caprolactam (50,000 mt/y).

Ta-She. Feed: ammonia, propylene, syngas. Product: acetic acid (60,000 mt/y), acrylonitrile (132,000 mt/y), methanol (66,000 mt/y).

Toufen. Feed: benzene, oleum. Product: caprolactam (50,000 mt/y), ethylene, (54,000 mt/y).

CHINA SYNTHETIC RUBBER CORP.
(Licensee of Witco Corp.—Concarb Div.)

Kaohsiung. Feed: indigenous E.B. Product: carbon black (45,000 mt/y).

CHINESE PETROLEUM CORP.

Kaohsiung. Feed: gas oil, naphtha. Products: benzene (355,000 mt/y), butadiene (130,000 mt/y), cyclohexane (60,000 mt/y), ethylene (899,000 mt/y), orthoxylene (60,000 mt/y), paraxylene (200,000 mt/y), propylene (437,000 mt/y).

CHIUNGLONG PETROCHEMICAL CL

Kaohsiung. Products: polypropylene glycol (22,000 mt/y), propylene glycol (5,560 mt/y), propylene oxide (15,000 mt/y).

DAIREN CHEMICAL CORP.

Kaohsiung. Feed: acetic acid, ethylene. Product: ethyl acetate (30,000 mt/y), vinyl acetate (100,000 mt/y).

FORMOSA PLASTICS CORP.

Jen-Wu and Lin-Yuan. Products: acrylics (100,000 mt/y), acrylic acid-esters (28,500 mt/y), hd polyethylene (120,000 mt/y), polyvinyl chloride (594,000 mt/y), vinyl chloride (720,000 mt/y).

FORMOSAN UNION CHEMICAL CORP.

Lin Yuan. Feed: benzene, n-olefin, propylene tetramer. Product: alkylbenzene (50,000 mt/y).

GRAND PACIFIC PETROCHEMICAL CORP.

Ta-She, Kaohsiung. Feed: benzene, ethylene. Products: ABS (20,000 mt/y), styrene (200,000 mt/y).

HO TUNG CHEMICAL CORP.

Jen-Wu, Kaohsiung. Feed: kerosine, light diesel. Product: normal paraffins (30,000 mt/y).

LEE CHANG YUNG CHEMICAL INDUSTRY CORP.

Hsin-Chu. Feed: natural gas. Products: formaldehyde (40,000 mt/y), methanol (65,000 mt/y).

Kaohsiung. Feed: methanol. Product: formaldehyde (100,000 mt/y).

Lin-Yuan. Feed: ethylene, propylene. Products: acetaldehyde (50,000 m/ty), acetone (25,000 mt/y).

ORIENTAL UNION CHEMICAL CORP.

Kaoshiung. Feed: ethylene. Products: ethylene glycol (150,000 mt/y), ethylene oxide (117,000 mt/y).

TAIWAN FERTILIZER CO.

Miaoli. Feed: natural gas. Products: ammonia (868 mt/d), urea (610 mt/d).

TAIWAN POLYPROPYLENE CL

Kaohsiung. Feed: ethylene, propylene. Product: polypropylene (120,000 mt/y).

TAIWAN SYNTHETIC RUBBER CORP.

Ta-She, Kaohsiung. Feed: butadiene, styrene. Products: polybutadiene (40,000 mt/y), SBR (100,000 mt/y).

USI FAR EAST CORP.

Kaohsiung. Feed: ethylene. Product: hd polyethylene (80,000 mt/y), ld polyethylene (140,000 mt/y).

COLOMBIA

AMONIACO DEL CARIBE SA

Cartagena. Feed: natural gas. Product: ammonia (350 mt/d).

CABOT COLOMBIANA SA
(subsidiary of Cabot Corp., Boston, Mass.)

Mamonal, Cartagena. Feed: aromatic tar, natural gas. Product: carbon black (20,000 mt/y).

CARBOQUIMICA SA.

Bogota. Feed: orthoxylene, oxoalcohols, coal tar. Products: benzene (2,000 mt/y), naphthalene (1,000 mt/y), phthalic anhydride (12,000 mt/y), plasticizers (20,000 mt/y), solvents (3,000 mt/y), toluene (2,000 mt/y), xylene mix (2,500 mt/y).

CIA. QUIMICA BORDEN SA

Yumbo, Valle. Feed: methanol. Products: formaldehyde (9,200 mt/y).

DOW COLOMBIANA SA

Cartagena. Feed: styrene. Product: polystyrene (27,500 mt/y).

EMPRESA COLOMBIANA DE PETROLEOS

Barrancabermeja. Feed: crude, natural gas. Products: alkylbenzene (15,000 mt/y), benzene (43,000 mt/y), cyclohexane (20,000 mt/y), ethylene (115,000 mt/y), orthoxylene (9,000 mt/y), propylene (5,500 mt/y), toluene (30,000 mt/y), xylene mix (36,000 mt/y), solvents (50,000 mt/y).

PETROQUIMICA COLOMBIANA SA

Mamonal, Cartagena. Feed: vinyl chloride. Products: polyvinyl chloride (102,000 mt/y).

POLICOLSA (owned by Ecopetrol)

Barrancabermeja. Feed: ethylene. Products: ld polyethylene (55,000 mt/y).

PRODUCTOS PETROQUIMICOS

Yumbo, Valle. Feed: aromatic tar. Product: carbon black (18,000 mt/y).

ECUADOR

CIA. QUIMICA BORDEN EQUATORIANA SA

Quito. Feed: methanol. Products: formaldehyde (9,200 mt/y).

EGYPT

AMERIA PETROLEUM REFINING CO.

Ameria. Feed: naphtha. Products: alkylbenzene (40,000 mt/y), benzene (23,000 mt/y), toluene (4,000 mt/y).

EGYPTIAN PETROCHEMICAL CO.

Ameria. Feed: imported ethylene, sodium chloride. Products: polyvinyl chloride (80,000 mt/y), vinyl chloride (100,000 mt/y).

EL NASR d'ENGRAIS et d'INDUSTRIES CHIMIQUES.

Suez-Attaka. Feed: natural gas. Product: ammonia (250 t/d).

Talkha. Feed: natural gas. Product: ammonia (396 t/d), urea (570,000 mt/y).

FINLAND

KEMIRA OY

Oulu. Feed: heavy fuel oil. Products: ammonia (85,000 mt/y), formic acid (20,000 mt/y), urea (100,000 mt/y).

NESTE OY

Porvoo. Feed: alcohols, benzene, cumene, ethylene, FCC gas, glycols, naphtha, n-hexane, n-pentane, orthoxylene, phthalic anhydride, propylene, pyrolysis gasoline, reformate, styrene, vacuum gas oil, vinyl chloride. Products: acetone (48,000 mt/y), benzene (110,000 mt/y), butadiene (20,000 mt/y), cumene (60,000 mt/y), ethylene (200,000 mt/y), phthalic anhydride (20,000 mt/y), phenol (60,000 mt/y), plasticizers (10,000 mt/y), polyester (10,000 mt/y), ld polyethylene (180,000 mt/y), polystyrene (30,000 mt/y), polyvinyl chloride (60,000 mt/y), propylene (170,000 mt/y).

FRANCE

AMMONIAC DE GRAND QUEVILLY
(77.5% CdF Chimie AZF, 22.5% Cofaz)

Grand Quevilly (near Rouen). Feed: natural gas. Product: ammonia (1,000 mt/d).

AMMONIAC SARRO-LORRAIN
(52% CdF Chimie AZF, 27% CSL, 15% Norsolor)

Carling. Feed: natural gas. Product: ammonia (330,000 mt/y).

ATOCHEM

Balan (Ain). Products: ld polyethylene (90,000 mt/y), lld polyethylene (35,000 mt/y).

Brignoud (Isère). Feed: vinyl chloride. Products: polyvinyl chloride (100,000 mt/y).

Chauny. Feed: naphthalene, orthoxylene. Product: phthalic anhydride (80,000 mt/y), plasticizers (60,000 mt/y).

Feyzin. Feed: ethane, naphtha. Products: aromatics (30,000 mt/y), benzene (30,000 mt/y), butadiene (30,000 mt/y), ethylene (120,000 mt/y), propylene (70,000 mt/y), toluene (10,000 mt/y).

Gonfreville l'Orcher. Feed: ethane, naphtha. Products: aromatics (150,000 mt/y), benzene (150,000 mt/y), butadiene (79,000 mt/y), ethylbenzene (275,000 mt/y), ethylene (370,000 mt/y), hd polyethylene (80,000 mt/y), ld polyethylene (160,000 mt/y), polystyrene (150,000 mt/y), propylene (220,000 mt/y), styrene (250,000 mt/y).

La Chambre (Savoie). Feed: acetone, ethanol, 2-butanol. Product: solvents (100,000 mt/y).

Lacq (Snea plant). Feed: ethane. Products: benzene (70,000 mt/y), ethylene (70,000 mt/y), styrene (50,000 mt/y).

Lavéra. Feed: ethane, naphtha. Products: aromatics (50,000 mt/y), butadiene (50,000 mt/y), ethylene (250,000 mt/y), propylene (185,000 mt/y), vinyl chloride (360,000 mt/y).

Mont (near Lacq). Feed: ammonia, ethylene, vinyl acetate. Product: ld polyethylene with copolymers (75,000 mt/y).

Notre Dame de Gravenchon (Seine Maritime). Feed: n-butenes. Product: 2-butanol (50,000 mt/y).

Saint Auban. Products: polyvinyl chloride (125,000 mt/y), vinyl chloride (120,000), solvents.

Saint Fons, Rhone. Product: polyvinyl chloride (155,000 mt/y).

AZOLACQ
(50% Cofaz, 50% CdF Chimie AZF)

Oissel. Feed: ammonia, carbon dioxide. Product: urea (360 mt/d).

BAYER ELASTOMÈRES

Lillebonne. Feed: butadiene, styrene. Products: polybutadiene (50,000 mt/y), SBR (18,000 mt/y), SBR latex (24,000 mt/y).

BORG WARNER

Villers Saint Sepulcre (Oise). Product: ABS (50,000 mt/y).

BP CHEMICALS LTD.

Wingles. Products: polystyrene (115,000 mt/y), expandable polystyrene (25,000 mt/y).

BP CHIMIE

Lavéra, Martigues. Feed: GPL, naphtha. Products: benzene (85,000 mt/y), butadiene (50,000 mt/y), ethylene (250,000 mt/y), ethylene glycol (165,000 mt/y), ethylene oxide (150,000 mt/y), polyisobutylene (36,000 mt/y), polyethylene (140,000 mt/y), propylene (180,000 mt/y).

CDF CHIMIE AZF
(100% CdF Chimie)
Mazingarbe. Feed: coke oven gas, naphtha. Products: ammonia (220,000 mt/y).
Toulouse. Feed: natural gas. Products: ammonia (330,000 mt/y), urea (150,000 mt/y).

CdF CHIMIE EP
Carling and Lillebonne. Feed: benzols, gazole, naphtha. Products: benzene (330,000 mt/y), butadiene (130,000 mt/y), cyclohexane (65,000 mt/y), ethylbenzene (280,000 mt/y), ethylene (420,000 mt/y), ld polyethylene (210,000 mt/y), propylene (220,000 mt/y), styrene (220,000 mt/y).

CDF CHIMIE RÉSINES
(100% CdF Chimie)
[illegible]. Feed: benzene, butadiene, styrene. Products: maleic-phthalic anhydride (20,000 mt/y), polyester (50,000 mt/y).
Saint Avold. Feed: aromatics. Product: hydrocarbon resins (24,000 mt/y).
Villers Saint Paul (Oise). Feed: benzene. Products: maleic anhydride (12,000 mt/y).

CIE. CHIMIQUE DE LA MEDITERRANEE
(joint venture of BASF and Shell group).
Berre l'Etang. Feed: ethylene. Product: ld polyethylene (105,000 mt/y).

CIE. DE RAFFINAGE ET DISTRIBUTION
Gonfreville l'Orcher. Feed: crude. Products: benzene (70,000 mt/y), propylene oligomers (40,000 mt/y).

CIE. DU POLYISOPRENE SYNTHETIQUE
Oudalle. Feed: C-5's, isoprene. Products: isoprene-azeotrope (45,000 mt/y), polyisoprene (45,000 mt/y).

COFAZ
Le Havre, Pardies, Rouen, Pierrefitte. Feed: gas. Products: ammonia (780,000 mt/y), urea (295,000 mt/y).

COPENOR-Compagnie Petrochimique du Nord
(60% CdF Chimie EP)
Dunkirk. Feed: naphtha, gazole, LPG. Products: butadiene (75,000 mt/y), ethylene (250-275,000 mt/y), ld polyethylene (275,000 mt/y), lld polyethylene (100,000 mt/y), propylene (120,000 mt/y).

DEGUSSA
Ambès. Feed: aromatic hydrocarbons, coal tar oil. Product: carbon black.

HGD—Huiles, Goudrons et Dérivés
(94% CdF Chimie)
Mariénau. Feed: coal tars. Product: naphthalene (20,000 mt/y).
Vendin le Vieil. Feed: coal tars. Product: naphthalene (25,000 mt/y).

ICI LTD.
Balycourt. Product: plasticizers (70,000 mt/y).

NOROXO
(100% CdF Chimie)
Harnes (Pas-de-Calais). Feed: olefins. Products: oxoalcohols (115,000 mt/y), oxoacids (20,000 mt/y).

NORSOLOR
(100% CdF Chimie)
Saint Avold. Feed: acetone, alcohols, ammonia, propylene. Products: acrylic acid (100,000 mt/y), acrylonitrile (90,000 mt/y), acrylic-esters (200,000 mt/y).

ORGANICHIM.
(100% CdF Chimie)
Toulouse. Product: formaldehyde (25,000 mt/y).
Villers St. Paul. Product: formaldehyde (50,000 mt/y).

PEC-RHIN
(50% CdF Chimie AZF, 50% BASF).
Ottmarsheim. Feed: natural gas. Product: ammonia (180,000 mt/y).

PETROSYNTHESE SA
(35% Chevron Chemical Co., 35% CFR, 30% Rhone-Poulenc)
Gonfreville. Feed: benzene, propylene. Products: alkylbenzene (100,000 mt/y).

POLYSAR FRANCE SA.
Strasbourg. Feed: acrylonitrile, benzene, butadiene, ethylene. Products: SBR latex, nitrile rubber (160,000 mt/y).

RHONE POULENC
Pardies. Feed: natural gas, methanol. Products: acetic acid (300,000 mt/y), vinyl acetate (160,000 mt/y).
Pont de Claix. Product: bisphenol A (60,000 mt/y).
Roussillon. Feed: acetic acid, benzene, propylene. Products: acetic anhydride (80,000 mt/y), acetone (60,000 mt/y), cumene (150,000 mt/y), phenol (100,000 mt/y).

SHELL CHIMIE
Berre. Feed: gas oil, LPG, naphtha. Products: acetone, linear alkylbenzene (45,000 mt/y), benzene (60,000 mt/y), butadiene (65,000 mt/y), ethylene (380,000 mt/y), isopropanol (108,000 mt/y), ld polyethylene (110,000 mt/y), polypropylene (120,000 mt/y), polystyrene (50,000 mt/y), polyvinyl chloride (120,000 mt/y), propylene (200,000 mt/y), toluene (12,000 mt/y), BR (50,000 mt/y), SBR (85,000 mt/y), TR (30,000 mt/y).

SOCABU-SOCIETE DU CAOUTCHOUC BUTYL
Notre Dame de Gravenchon. Feed: refinery products. Products: butyl rubber (52,000 mt/y), ethylene-propylene rubber (50,000 mt/y).

SOCIÉTÉ ARTESIENNE DE VINYLE
(DSM subsidiary)
Mazingarbe. Product: polyvinyl chloride (160,000 mt/y).

SOCIÉTÉ CHIMIQUE DE DIEUZE
(100% CdF Chimie EP)
Dieuze. Feed: styrene. Product: polystyrene (75,000 mt/y).
Ribecourt. Feed: styrene. Product: polystyrene (110,000 mt/y).

SOCIÉTÉ DES ENGRAIS DE L'ILE DE FRANCE
(50% CdF Chimie AZF, 50% Grande Paroisse)
Nangis. Feed: natural gas. Product: ammonia (300,000 mt/y).

SOCIÉTÉ DU CHLORURE DE VINYLE DE FOS
(60% Shell Chimie, 40% Atochem)
Fos sur Mer (Bouches du Rhône). Feed: chlorine, ethylene. Product: vinyl chloride (200,000 mt/y).

SOCIÉTÈ DU POLYETHYLENE DE FOS
(75% Shell, 25% ICI)
Fos sur Mer (Bouches du Rhone). Feed: ethylene. Product: ld polyethylene (100,000 mt/y).

SOCIÉTÉ FRANCAISE EXXON CHEMICAL
Notre Dame de Gravenchon. Feed: refinery products. Products: butadiene (70,000 mt/y), ethylene (300,000 mt/y), propylene (220,000 mt/y), solvents (60,000 mt/y).

SOCIÉTÉ FRANCAISE HOECHST
Cuise-LaMotte. Feed: methanol. Product: formaldehyde (12,000 mt/y).
Lillebonne. Feed: ethylene. Product: acetaldehyde (98,000 mt/y).

SOCIÉTÉ NORMANDE DE L'AZOTE
(56% Cofaz, 44% CdF Chimie AZF)
Gonfreville. Feed: naphtha, natural gas. Products: ammonia (330,000 mt/y), urea (250,000 mt/y).

SODES—Société d'Ethanol de Synthèse
(30% Atochem, 45% Rhone Poulenc, 25% SFECI)
Lillebonne. Product: ethanol (100,000 mt/y).

SOLVAY & CIE.
Sarralbe. Feed: ethylene, propylene. Products: hd polyethylene, polypropylene.
Tavaux. Feed: ethylene. Products: polyvinyl chloride, vinyl chloride.

TOTAL CHIMIE SA.
Gonfreville. Feed: heavy reformate. Products: orthoxylene (80,000 mt/y), paraxylene (75,000 mt/y), toluene (16,000 mt/y), xylene mix (130,000 mt/y).

UNITED CHEMICAL FRANCE
Port Jerome. Feed: aromatic oils. Product: carbon black (88,000 mt/y).

USINES LAMBIOTTE
(100% Atochem)
Premery. Product: acetic acid (3,500 mt/y).

GERMANY

AMH CHEMIE
Brunsbuettel. Feed: residue. Products: ammonia (550,000 mt/y), urea (330,000 mt/y).

BASF AG
Ludwigshafen. Feed: fuel oil, naphtha, natural gas. Products: acetic acid (40,000 mt/y), acetylene (85,000 mt/y), acrylic acid (210,000 mt/y), ammonia (700,000 mt/y), butanols (220,000 mt/y), caprolactam (150,000 mt/y), ethylbenzene (350,000 mt/y), ethylene (450,000 mt/y), ethylene oxide (150,000 mt/y), formaldehyde (1,200,000 mt/y), melamine (40,000 mt/y), methanol (220,000 mt/y), higher oxoalcohols (100,000 mt/y), 2-ethylhexanol (150,000 mt/y), phthalic anhydride (85,000 mt/y), polyamide (85,000 mt/y), ld polyethylene (18,000 mt/y), polyisobutylene (6,000 mt/y), polypropylene (10,000 mt/y), polystyrene (265,000 mt/y), polyvinyl chloride (150,000 mt/y), propanol (25,000 mt/y), propylene (240,000 mt/y), propylene glycol (40,000 mt/y), propylene oxide (75,000 mt/y), styrene (500,000 mt/y), urea (480,000 mt/y), vinyl chloride (100,000 mt/y), plasticizers (220,000 mt/y).

BAYER AG
Leverkusen. Product: formaldehyde (95,000 mt/y).
Uerdingen. Products: alkyds (30,000 mt/y), aniline (300,000 mt/y), maleic anhydride (10,000 mt/y), phthalic anhydride (50,000 mt/y), polyester (80,000 mt/y).

BP BENZIN UND PETROLEUM AG UND CALIFORNIA CHEMICAL GmbH oHG.
(owned jointly by Chevron Chemical Company and BP Benzin und Petroleum AG)
Dinslaken. Feed: reformate. Products: orthoxylene (24,000 mt/y), paraxylene (20,000 mt/y).

CABOT GmbH
Hanau. Feed: petroleum fractions, natural gas. Product: carbon black (50,000 mt/y).

CHEMISCHE WERKE SAARLOTHRINGEN
(100% CdF Chimie)
Perl/Besch. Feed: ammonia. Products: formaldehyde (44,000 mt/y), urea (200,000 mt/y), resins (12,000 mt/y).

COLUMBIAN CARBON DEUTSCHLAND
Hamburg. Feed: oil. Product: aromatics mix (40-80,000 mt/y).

CONDEA CHEMIE GmbH
(owned by Conoco Inc. and Deutsche Texaco AG)
Brunsbüttel. Feed: ethylene, hydrogen. Products: synthetic straight chain primary fatty alcohols (75,000 mt/y).

DEGUSSA AG
Bruchhausen. Feed: methyl alcohol. Product: formaldehyde.
Kalscheuren. Feed: aromatic hydrocarbons, coal tar oil. Product: carbon black.
Mainz-Mombach. Feed: methyl alcohol. Product: formaldehyde.

DEUTSCHE MARATHON PETROLEUM GmbH
(subsidiary of Marathon Petroleum Co.)

Burghausen, Bavaria. Feed: refinery streams. Products: benzene (120,000 mt/y), butadiene (90,000 mt/y), ethylene (280,000 mt/y), propylene (130,000 mt/y).

DEUTSCHE SHELL AG

Cologne-Godorf. Feed: pyrolysis gasoline, reformate. Products: benzene (400,000 mt/y), orthoxylene (100,000 mt/y), paraxylene (75,000 mt/y), toluene (220,000 mt/y).

DEUTSCHE SOLVAY-WERKE GmbH

Rheinberg. Feed: ethylene. Products: polyvinyl chloride, vinyl chloride.

DEUTSCHE TEXACO AG

Heide. Feed: refinery products. Products: benzene (34,000 mt/y), butylenes (28,000 mt/y), ethylbenzene (11,000 mt/y), ethylene (80,000 mt/y), MTBE (12,500 mt/y), orthoxylene (12,000 mt/y), parametaxylene (38,000 mt/y), propylene (55,000 mt/y), toluene (75,000 mt/y).

Meerbeck und Duisburg. Feed: refinery products and chemicals. Products: acetone (36,000 mt/y), alkylbenzene (25,000 mt/y), alkyl chlorides (2,000 mt/y), isopropanol (140,000 mt/y), maleic anhydride (7,500 mt/y), plasticizers (24,000 mt/y), resins (36,000 mt/y), ketones (99,000 mt/y).

DOW CHEMICAL

Rheinmuenster. Products: SB-latex, resins.

Stade. Products: bisphenol, propylene oxide, propylene glycol, resins, solvents.

DYNAMIT NOBEL AG

Luisdorf. Products: dimethyl terephthalate (150,000 mt/y), ethylene dichloride (85,000 mt/y).

Steyerberg. Product: dimethyl terephthalate (180,000 mt/y).

EC ERDOLCHEMIE GmbH
(owned by Bayer AG and Deutsche BP AG)

Worringen, Cologne. Feed: naphtha. Products: acrylonitrile (280,000 mt/y), ammonia (300,000 mt/y), benzene (200,000 mt/y), butadiene (245,000 mt/y), butylenes (90,000 mt/y), ethanol (40,000 mt/y), ethylene (740,000 mt/y), ethylene glycol (150,000 mt/y), ethylene oxide (150,000 mt/y), propylene (520,000 mt/y), propylene glycol (24,000 mt/y), propylene oxide (135,000 mt/y), toluene (100,000 mt/y).

ESSO CHEMIE GmbH

Cologne. Feed: refinery stocks. Products: butadiene (20,000 mt/y), butylenes (18,000 mt/y), ethylene (450,000 mt/y), polyisobutylene (45,000 mt/y), propylene (240,000 mt/y).

Hamburg. Feed: refinery. Product: solvents (100,000 mt/y).

HOECHST AG

Frankfurt. Feed: ethylene, propylene, natural gas. Products: acetaldehyde (130,000 mt/y), acetic acid (145,000 mt/y), hd polyethylene (130,000 mt/y), polyvinyl alcohol (25,000 mt/y), vinyl acetate (150,000 mt/y).

Gendorf. Feed: ethylene. Products: ethylene glycol (100,000 mt/y), ethylene oxide (120,000 mt/y), polyvinyl chloride (150,000 mt/y), vinyl chloride (135,000 mt/y).

Gersthofen. Feed: p-xylene, methanol. Product: dimethyl terephthalate (120,000 mt/y).

Kelsterbach. Feed: olefins. Products: ethylene glycol-ethylene oxide (45,000 mt/y), polypropylene (135,000 mt/y).

Knapsack. Feed: olefins. Products: acetaldehyde (150,000 mt/y), acetic acid (70,000 mt/y), acetic anhydride (100,000 mt/y), polypropylene (85,000 mt/y), hd polyethylene (100,000 mt/y), polyvinyl chloride (90,000 mt/y), vinyl chloride (100,000 mt/y).

Muenchsmuenster. Feed: ammonia, ethylene, propylene. Products: acrylonitrile (90,000 mt/y), hd polyethylene (80,000 mt/y).

Offenbach. Feed: p-xylene, methanol. Product: dimethyl terephthalate (105,000 mt/y).

HÜLS

Marl. Products: acetaldehyde (80,000 mt/y), acetic acid (40,000 mt/y), acetylene (120,000 mt/y), alkylbenzene (80,000 mt/y), butanol-n-isobutanol (130,000 mt/y), butylenes (30,000 mt/y), butyraldehyde (310,000 mt/y), cumene (110,000 mt/y), ethanol (130,000 mt/y), ethylbenzene (300,000 mt/y), ethylchloride (30,000 mt/y), ethylene (50,000 mt/y), ethylene dichloride (250,000 mt/y), ethylene glycol (90,000 mt/y), ethylene oxide (150,000 mt/y), isopropanol (110,000 mt/y), maleic anhydride (35,000 mt/y), oxoalcohols (200,000 mt/y), phthalic anhydride (150,000 mt/y), polyamide 12 (14,000 mt/y), polyester (25,000 mt/y), polyethylene (160,000 mt/y), polypropylene (120,000 mt/y), polystyrene (135,000 mt/y), polyvinyl chloride (380,000 mt/y), propylene glycol (22,000 mt/y), propylene oxide (27,000 mt/y), styrene (250,000 mt/y), vinyl chloride (350,000 mt/y), EPS (60,000 mt/y).

ICI

Waldshut. Product: polyvinyl chloride (25,000 mt/y).

Wilhelmshaven. Product: polyvinyl chloride (150,000 mt/y).

PHENOLCHEMIE GmbH

Gladbeck. Feed: cumene. Products: acetone (250,000 mt/y), phenol (400,000 mt/y).

RHEINISCHE OLEFINWERKE GmbH

Wesseling. Feed: gas oil, naphtha. Products: butadiene (150,000 mt/y), ethylene (650,000 mt/y), ethylbenzene (430,000 mt/y), ld polyethylene (400,000 mt/y), hd polyethylene (215,000 mt/y), polyisobutylene (8,000 mt/y), polypropylene (130,000 mt/y), propylene (300,000 mt/y), styrene (420,000 mt/y), SB rubber (30,000 mt/y).

RUHRCHEMIE AG

Oberhausen, Holten. Feed: olefins. Products: oxoalcohols (335,000 mt/y), hd polyethylene (80,000 mt/y).

RUHR OEL GMBH
(50% Veba Oel AG, 50% Petróleos de Venezuela SA)

Gelsenkirchen. Feed: gas oil, naphtha, distil resid. Products: ammonia (400,000 mt/y), benzene (320,000 mt/y), cumene (330,000 mt/y), cyclohexane (100,000 mt/y), ethylene (400,000 mt/y), methanol (200,000 mt/y), orthoxylene (110,000 mt/y), n-paraffins (100,000 m/ty), paraxylene (120,000 mt/y), propylene (245,000 mt/y), toluene (90,000 mt/y).

Münchsmünster. Feed: LPG, naphtha. Products: ethylene (200,000 m/ty), propylene (130,000 mt/y).

RUHR STICKSTOFF AG

Brunsbüttel. Feed: heavy fuel oil. Products: ammonia (550,000 mt/y), urea (330,000 mt/y).

UNION RHEINISCHE BRAUNKOHLEN KRAFTSTOFF AG

Wesseling. Feed: LPG, natural gas, pyrolysis gasoline, reformate, resid, refinery gas, xylene mix. Products: benzene (120,000 mt/y), ethylene (440,000 mt/y), methanol (400,000 mt/y), orthoxylene (32,000 mt/y), paraxylene (72,000 mt/y), propylene (260,000 mt/y), toluene (80,000 mt/y), xylene mix (62,000 mt/y).

WACKER-CHEMIE GmbH

Burghausen/Obb. Feed: ethylene. Products: acetaldehyde, acetic acid, acetic anhydride, ethylene dichloride, plasticizers, polyvinyl acetate, polyvinyl alcohol, polyvinyl chloride, vinyl acetate, vinyl chloride, solvents.

WINTERSHALL AG

Ibbenbüren. Feed: benzene, chlorine, n-paraffins. Product: alkylbenzene (36,000 mt/y).

Lingen-Ems. Feed: reformate, benzene-hydrogen, kerosine. Products: benzene (72,000 mt/y), cyclohexane (100,000 mt/y), normal paraffins (30,000 mt/y).

Mannheim. Feed: pyrolysis-gasoline, reformate. Products: benzene (270,000 mt/y).

GREECE

DOW CHEMICAL

Lavrion. Product: polystyrene.

EKO CHEMICALS CO. AE

Thessaloniki. Feed: naphtha, refinery cuts, vinyl chloride. Products: ammonia (120,000 mt/y), ethylene (15,000 mt/y), ethylene dichloride (35,000 mt/y), normal paraffins (45,000 mt/y), polyvinyl chloride (70,000 mt/y).

HADJILUCAS SA

Halkis. Feed: methanol. Product: formaldehyde (20,000 mt/y).

HUNGARY

BORSODI VEGYI KOMBINÁT

Kazincbarcika. Feed: ethylene, natural gas. Products: ammonia (220,000 mt/y), ethylene dichloride (170,000 mt/y), polyamide (1,300 mt/y), polyvinyl chloride (190,000 mt/y), urea (120,000 mt/y), vinyl chloride (170,000 mt/y).

HUNGARIAN OIL AND GAS TRUST

Százhalombatta. Feed: pyrolysis gasoline, reformate, vac gas oil (FCC unit). Products: benzene (110,000 mt/y), maleic anhydride (10,000 mt/y), orthoxylene (52,000 mt/y), propylene (42,000 mt/y), toluene (110,000 mt/y), xylene mix (48,000 mt/y).

TISZAI VEGYI KOMBINÁT

Leninváros. Feed: naphtha, natural gas. Products: ammonia (265,000 mt/y), butadiene (80,000), ethylene (250,000 mt/y), ld polyethylene (195,000 mt/y), polypropylene (100,000 mt/y), propylene (125,000 mt/y).

INDIA

ADARSH CHEMICALS & FERTILIZERS LTD.

Udhna, Gujarat. Feed: benzene. Product: maleic anhydride (3,000 mt/y).

AHMEDABAD MANUFACTURING & CALICO PRINTING CL

Baroda. Feed: dimethyl terephthalate, ethylene glycol. Product: polyester (7,968 mt/y).

BAKELITE HYLAM LTD.

Sanathnagar, Hyderabad. Feed: phenol, formaldehyde, styrene, maleic-phthalic anhydride, isophthalic acid, propylene glycol. Products: formaldehyde (3,000 mt/y), phenolic resins (1,800 mt/y), polyester resins (1,800 mt/y).

BONGAIGAON REFINERY & PETROCHEMICALS LTD.

Dhaligaon, Assam. Feed: 110-145°C cut naphtha TBP. Products: dimethyl terephthalate (45,000 mt/y), orthoxylene (6,000 mt/y), paraxylene (29,000 mt/y).

CHEMICALS & PLASTICS INDIA LTD.

Krishnagiri. Feed: molasses. Product: ethanol (12,000 mt/y).

Metturdam. Feed: chlorine, ethanol. Products: ethylene (18,700 mt/y), ethylene dichloride (37,000 mt/y), polyvinyl chloride (21,300 mt/y), vinyl chloride (22,000 mt/y).

COROMANDEL FERTILIZERS LTD.
(International Minerals & Chemicals Corp., Chevron Chemical Corp., E.I.D. Parry (India) Ltd.)

Visakhapatnam, Andhra Pradesh. Feed: naphtha. Products: ammonia (114,500 mt/y), urea (108,000 mt/y).

FERTILIZER CORP. OF INDIA LTD.

Gorakhpur, Uttar Pradesh. Feed: naphtha. Products: ammonia (171,000 mt/y), urea (285,000 mt/y).

Ramagundam, Andhra Pradesh. Feed: coal. Products: ammonia (297,000 mt/y), urea (495,000 mt/y).

Sindri, Bihar. Feed: fuel oil. Products: ammonia (297,000 mt/y), urea (330,000 mt/y).

Talcher, Orissa. Feed: coal. Products: ammonia (297,000 mt/y), urea (495,000 mt/y).

FERTILIZERS AND CHEMICALS, TRAVANCORE LTD. (FACT) and FACT ENGINEERING AND DESIGN ORGANIZATION (FEDO)

Ambalamedu (near Cochin), Kerala. Feed: naphtha. Products: ammonia (600 mt/d), urea (1,000 mt/d).

Udyogamandal (near Cochin), Kerala. Feed: naphtha. Products: urea (340 mt/d).

GARWARE NYLONS LTD.

Pimpri, Poona. Feed: caprolactam, dimethyl terephthalate, ethylene glycol. Products: nylon 6 (4,830 mt/y), polyamide (360 mt/y), polyester (1,576 mt/y).

GUJARAT NARMADA VALLEY FERTILIZERS CL

Narmadanagar, Bharuch. Feed: fuel oil. Products: ammonia (1,300 mt/d), methanol (60 mt/d), urea (1,800 mt/d).

GUJARAT STATE FERTILIZERS CL

Fertilizernagar (near Baroda). Feed: benzene, fuel oil, naphtha, natural gas, urea. Products: ammonia (348,000 mt/y), caprolactam (20,000 mt/y), cyclohexane (22,500 mt/y), melamine (5,000 mt/y), nylons (4,000 mt/y), urea (367,200 mt/y).

HERDILLIA CHEMICALS LTD.

Thane, Bombay. Feed: benzene, propylene, orthoxylene, 2-ethyl hexanol. Products: acetone (11,430 mt/y), cumene (29,800 mt/y), phenol (19,050 mt/y), phthalic anhydride (8,600 mt/y), plasticizers (9,500 mt/y), solvents (2,400 mt/y), styrene (900 mt/y).

HINDUSTAN FERTILIZER CORP. LTD.

Barauni (Bihar). Feed: naphtha. Products: ammonia (600 mt/d), urea (1,000 mt/d).

Durgapur. Feed: naphtha. Products: ammonia (600 mt/d), urea (1,000 mt/d).

Haldia. Feed: fuel oil. Products: ammonia (600 mt/d), methanol (125 mt/d), urea (500 mt/d).

Namrup (Assam). Feed: natural gas. Products: ammonia (1,400 mt/d), urea (2,167 mt/d).

HINDUSTAN ORGANIC CHEMICALS LTD.

(Government of India enterprise).

Rasayani, Raigad. Products: acetic acid (1,330 mt/y), acetic anhydride (2,000 mt/y), formaldehyde (15,000 mt/y).

HINDUSTAN POLYMERS

(A unit of McDowell & CL)

Visakhapatnam. Feed: benzene, molasses. Products: styrene (15,000 mt/y), polystyrene (12,500 mt/y).

IEL LTD.

Kanpur, Uttar Pradesh. Feed: naphtha. Products: ammonia (411,000 mt/y), urea (675,000 mt/y).

Rishra, West Bengal. Feed: alcohol. Products: ethylene (12,000 mt/y), ld polyethylene (12,000 t/y).

ILAC LTD.

(100% Ahmedabad Mfg. & Calico Printing CL)

Bombay. Feed: acetylene. Product: polyvinyl chloride (25,000 mt/y), vinyl chloride (6,500 mt/y).

INDIAN FARMERS FERTILIZER COOPERATIVE

Kalol, Gujarat. Feed: natural gas. Products: ammonia (300,300 mt/y), urea (396,000 mt/y).

Phulpur, Uttar Pradesh. Feed: ammonia. Products: ammonia (297,000 mt/y), urea (495,000 mt/y).

INDIAN OIL CORP. LTD.

Jawaharnagar. Feed: reformate. Products: benzene (45,000 mt/y), toluene (16,000 mt/y).

INDIAN PETROCHEMICALS CORP. LTD.

Baroda, Gujarat. Feed: naphtha. Products: acrylonitrile (24,000 mt/y), alkylbenzene (30,000 mt/y), benzene (23,600 mt/y), butadiene (22,000 mt/y), carbon black feedstock (17,900 mt/y), dimethyl terepthalate (30,000 mt/y), ethylene (130,000 mt/y), ethylene dichloride (100,000 mt/y), ethylene glycol (20,000 mt/y), ethylene oxide (5,000 mt/y), normal paraffins (25,000 mt/y), orthoxylene-mixed xylene (23,500 mt/y), paraxylene (17,000 mt/y), polybutadiene rubber (20,000 mt/y), ld polyethylene (80,000 mt/y), polypropylene (30,000 mt/y), polyvinyl chloride (55,000 mt/y), propylene (81,300 mt/y), solvents (20,000 mt/y), vinyl chloride (57,300 m/ty).

MADRAS FERTILIZERS LTD.

Manali. Feed: sr naphtha. Products: ammonia (247,500 mt/y), urea (292,000 mt/y).

MYSORE PETROCHEMCIALS LTD.

Raichur, Karnataka. Feed: orthoxylene. Product: phthalic anhydride (9,000 mt/y).

NAGARJUNA FERTILIZERS AND CHEMICALS LTD.

Kakinada. Feed: naphtha, natural gas. Products: ammonia (900 mt/d), toluene (1,500 mt/d).

NATIONAL FERTILIZERS LTD.

Bhatinda, Punjab. Feed: fuel oil, low sulfur heavy stock. Products: ammonia (297,000 mt/y), urea (511,500 mt/y).

Naya Nangal, Punjab. Feed: fuel oil, low sulfur heavy stock. Products: ammonia (297,000 mt/y), methanol (16,500 mt/y), urea (330,000 mt/y).

Panipat, Haryana. Feed: fuel oil, low sulfur heavy stock. Products: ammonia (297,000 mt/y), urea (511,500 mt/y).

NATIONAL ORGANIC CHEMICAL INDUSTRIES LTD.

Thane. Feed: naphtha. Products: acetone (14,000 mt/y), benzene (17,000 mt/y), butadiene (7,200 mt/y), butanol (6,000 mt/y), ethylene (63,000 mt/y), ethylene dichloride (50,000 mt/y), ethylene glycol-diethylene glycol (11,000 mt/y), ethylene oxide (14,000 mt/y), isopropanol (4,000 mt/y), oxoalcohols (10,000 mt/y), polyvinyl chloride (21,500 mt/y), propylene (37,000 mt/y), vinyl chloride (30,000 mt/y).

PHILLIPS CARBON BLACK LTD.

(owned by Phillips Petroleum, Duncan Bros. CL, and public)

Durgapur, West Bengal. Feed: heavy oil. Product: carbon black (40,000 mt/y).

POLYCHEM LTD.

Baroda. Feed: acrylonitrile, butadiene, styrene. Product: ABS (2,000 mt/y).

Bombay. Feed: benzene, ethylene. Products: divinyl benzene (150 mt/y), ethylbenzene (17,000 mt/y), ethylene (2,000 mt/y), polystyrene (16,000 mt/y), styrene (14,000 mt/y), toluene (700 mt/y).

Nira (Maharashtra). Feed: acetic acid, ethanol, molasses, oxygen. Product: ethanol (7,270 mt/y), ethylene (4,000 mt/y), vinyl acetate (10,000 mt/y).

POLYOLEFINS INDUSTRIES LTD. (PIL).

Thane, Maharashtra. Feed: ethylene. Product: hd polyethylene (50,000 mt/y).

RASHTRIYA CHEMICALS & FERTILIZERS LTD.

Chembur, Bombay. Feed: associated gas, naphtha. Products: ammonia (402,600 mt/y), methanol (36,000 mt/y), urea (429,000 mt/y).

Thal, Alibag. Feed: associated gas. Products: ammonia (891,000 mt/y), urea (1, 485,000 mt/y).

SHRI AMBUJA PETROCHEMICALS LTD.

Patancheru, Medak District. Feed: orthoxylene. Product: phthalic anhydride (8,600 mt/y).

SHRIRAM FERTILIZERS AND CHEMICALS

Kota, Rajasthan. Feed: naphtha. Products: ammonia (200,000 mt/y), polyvinyl chloride (33,000 mt/y), urea (330,000 mt/y).

SOUTHERN PETROCHEMICAL INDUSTRIES CORP. LTD.

Tuticorin, Tamil Nadu. Feed: naphtha. Products: ammonia (352,000 mt/y), urea (512,000 mt/y).

SYNTHETICS AND CHEMICALS LTD.

(with Kilachand Devchand & Co. and Firestone Tire & Rubber Co.)

Bareilly, Uttar Pradesh. Feed: alcohol, benzene, petrobutadiene. Products: acetaldehyde (22,000 mt/y), butadiene (25,200 mt/y), ethylene (4,000 mt/y), styrene (11,200 mt/y), NBR (2,000 mt/y), SBR (33,000 mt/y).

THIRUMALAI CHEMICALS LTD.

Ranipet, Tamil Nadu. Feed: orthoxylene. Products: phthalic anhydride (20,000 mt/y).

UNION CARBIDE INDIA LTD.

Bombay. Feed: alcohol, naphtha. Products: acetaldehyde (11,000 mt/y), acetic acid (2,000 mt/y), acetylene (900 mt/y), aromatics mix (5,400 mt/y), benzene (2,800 mt/y), butanol (4,200 mt/y), ethylene (22,450 mt/y), polyethylene (20,425 mt/y), propylene (5,500 mt/y), toluene (2,000 mt/y), solvents (6,000 mt/y).

UNITED CARBON INDIA LTD.

Thane. Feed: lube extracts, naphtha cracker bottoms. Product: carbon black (35,700 mt/y).

ZUARI AGRO CHEMICALS LTD.

(Birla Gwalior Pvt. Ltd. and public interests)

Zuarinagar. Feed: naphtha. Products: ammonia (220,000 mt/y), urea (340,000 mt/y).

INDONESIA

PERTAMINA

(state oil company)

Plaju, South Sumatra. Feed: propylene. Product: polypropylene (20,000 mt/y).

Rantau, North Sumatra. Feed: natural gas. Product: carbon black (5,000 mt/y).

PERUM PETROKIMIA GRESIK.

Gresik, Surabaya. Feed: fuel oil. Products: ammonia (3,600 mt/y), urea (45,000 mt/y).

P.T. PUSRI

Palembang, South Sumatra. Feed: natural gas. Product: urea (460,000 mt/y).

P.T. PUPUK KUJANG

Cikampek, Java. Feed: natural gas. Products: ammonia (330,000 mt/y), urea (570,000 mt/y).

ISRAEL

ELECTROCHEMICAL INDUSTRIES (FRUTAROM) LTD.

Near Aco. Feed: ethylene. Products: ethylene dichloride (160,000 mt/y), polyvinyl chloride (90,000 mt/y), vinyl chloride (100,000 mt/y).

FERTILIZERS & CHEMICALS LTD.

Haifa. Feed: LP-gas, naphtha, Bunker C. Products: ammonia (80,000 mt/y), urea (32,000 mt/y).

GADOT PETROCHEMICAL INDUSTRIES LTD.

Haifa Bay. Feed: reformate, pyrolysis gasoline. Products: aromatics mix (150,000 mt/y), benzene (40,000 mt/y), normal paraffins (40,000 mt/y), orthoxylene (15,000 mt/y), paraxylene (20,000 mt/y), phthalic anhydride (12,000 mt/y), toluene (50,000 mt/y), xylene mix (60,000 mt/y).

ISRAEL PETROCHEMICAL ENTERPRISES LTD.

Haifa. Feed: ethylene, styrene. Products: ld polyethylene (100,000 mt/y), polystyrene (16,000 mt/y).

ITALY

AGRIMONT SpA

(Montedison Group)

Ferrara. Feed: natural gas. Products: ammonia (490,000 mt/y), urea (550,000 mt/y).

Porto Marghera. Feed: natural gas. Products: ammonia (175,000 mt/y), urea (180,000 mt/y).

Priolo. Feed: natural gas. Products: ammonia (330,000 mt/y), urea (200,000 mt/y).

San Giuseppe di Cairo. Feed: natural gas. Products: ammonia (170,000 mt/y), urea (200,000 mt/y).

ASHLAND CHEMICAL ITALIANA SpA

Milan. Products: acrylics (1,000 mt/y), alkyds (8,000 mt/y).

AUSIND SpA

(Montedison Group)

Castellanza. Feed: natural gas. Products: formaldehyde (300,000 mt/y), melamine (26,000 mt/y), methanol (120,000 mt/y), urea (100,000 mt/y).

CABOT ITALIANA SpA

(subsidiary of Cabot Corp., Boston, Mass.)

Ravenna. Feed: petroleum fractions, aromatic tar. Product: carbon black (75,000 mt/y).

CHIMICA DEL FRIULI
(Snia Viscosa group)

Torviscosa (Udine). Product: caprolactam (20,000 mt/y)

CHIMICA DEL TIRSO
(50% EniChem, 50% Montefibre)

Ottana (Sardinia). Feed: paraxylene. Product: terephthalic acid (80,000 mt/y).

CHIMICA DI COLLEFERRO SpA
(Snia Viscosa group)

Colleferro. Product: polyester (40,000 mt/y).

COLUMBIAN CARBON EUROPA SpA

Trecate. Feed: heavy aromatic hydrocarbons. Product: furnace carbon black (50,000 mt/y).

DISTILLERIE ITALIANE
(Alusuisse Italia SpA)

San Giovanni Valdarno (Arezzo). Products: acrylic acid-esters (2,500 mt/y), polyester (30,000 mt/y), solvents (14,000 mt/y), plasticizers (64,000 mt/y).

DOW CHEMICAL SpA

Livorno. Products: polystyrene, SB-latex.

DUTRAL
(Montedison Group)

Ferrara. Product: EPR (60,000 mt/y).

ENICHEM

Gela. Feed: naphtha, natural gas. Products: acrylonitrile (90,000 mt/y), ammonia (220,000 mt/y), aromatics (150,000 mt/y), benzene (80,000 mt/y), butadiene (40,000 mt/y), ethylene (310,000 mt/y), ethylene dichloride (125,000 mt/y), ethylene glycol (46,000 mt/y), ethylene oxide (40,000 mt/y), ld polyethylene (90,000 mt/y), hd polyethylene (40,000 mt/y), polypropylene (50,000 mt/y), propylene (160,000 mt/y), toluene (90,000 mt/y), urea (200,000 mt/y), xylene mix (80,000 mt/y).

Manfredonia. Feed: natural gas. Products: ammonia (360,000 mt/y), urea (630,000 mt/y).

Pisticci. Feed: natural gas. Products: acrylic esters (7,000 mt/y), methanol (65,000 mt/y).

Ragusa. Feed: ethylene. Product: ld polyethylene (140,000 mt/y).

Ravenna. Feed: natural gas. Products: acetic acid (30,000 mt/y), acetylene (50,000 mt/y), ammonia (310,000 mt/y), butadiene (100,000 mt/y), isoprene (30,000 mt/y), polybutadiene (45,000 mt/y), polyisoprene (30,000 mt/y), polyvinyl acetate (25,000 mt/y), styrene (41,000 mt/y), urea (70,000 mt/y), vinyl acetate (30,000 mt/y), ABS (40,000 mt/y), SBR (150,000 mt/y), SBR latex (30,000 mt/y), nitrile (8,000 mt/y), solvents (100,000 mt/y).

FAR—Fabrica Adesivi Resine

Filego, Bergamo District. Products: formaldehyde (100,000 mt/y), acrylics (20,000 mt/y), polyvinyl acetate (25,000 mt/y).

FTALITAL
(Alusuisse Italia SpA)

Scanzorosciate (Bergamo). Feed: benzene, butane, naphthalene, orthoxylene. Products: maleic anhydride (38,000 mt/y), phthalic anhydride (80,000 mt/y).

ICAM
(100% EniChem)

Priolo. Feed: naphtha, gas oil. Products: ethylene (600,000 mt/y), propylene.

HIMONT ITALIA

Brindisi. Feed: propylene. Product: polypropylene (120,000 mt/y).

Ferrara. Feed: propylene. Product: polypropylene (85,000 mt/y).

Terni. Feed: propylene. Product: polypropylene (140,000).

INDUSTRIA ITALIANA PETROLI SpA

Rho. Feed: crude oil. Products: benzene (14,400 mt/y), toluene (24,000 mt/y), xylene mix (8,600 mt/y).

MOBIL CHIMICA ITALIANA

Naples. Feed: light naphtha, hp reformate. Products: benzene (65,000 mt/y), cyclohexane (50,000 mt/y), orthoxylene (60,000 mt/y), paraxylene (75,000 mt/y), toluene (5,000 mt/y), xylene mix (45,000 mt/y).

MONTEDIPE
(Montedison Group)

Ferrara. Product: polyester (6,500 mt/y).

Mantova. Products: acetone (140,000 mt/y), ethylbenzene (350,000 mt/y), ethylene dichloride (200,000 mt/y), maleic anhydride (11,000 mt/y), phenol (230,000 mt/y), polystyrene (270,000 mt/y), styrene (350,000 mt/y).

Porto Marghera. Products: acetic acid (65,000 mt/y), acetylene (40,000 mt/y), caprolactam (100,000 mt/y), ethylene (350,000 mt/y), propylene (180,000 mt/y), vinyl acetate (55,000 mt/y).

Priolo. Products: acetaldehyde (140,000 mt/y), ethylene dichloride (190,000 mt/y), ethylene oxide (15,000 mt/y), propylene glycol (13,000 mt/y), propylene oxide (40,000 mt/y).

Villadossola. Products: acrylics (11,000 mt/y), polyvinyl alcohol (2,000 mt/y), polyvinyl acetate (64,000 mt/y), polyvinyl acetate-ethylene (25,000 mt/y).

SARAS CHIMICA
(60% EniChem, 20% Saras, 20% Montedison)

Sarroch (Sardinia). Feed: refinery feedstock. Products: cumene (200,000 mt/y), ethylbenzene (40,000 mt/y), n-paraffins (160,000 mt/y), orthoxylene (80,000 mt/y), paraxylene (80,000 mt/y).

SARPOM

Trecate (Novara). Feed: intermediate and heavy virgin naphtha. Products: aromatics mix (18,000 mt/y), cyclohexane (3,000 mt/y), normal paraffins (69,000 mt/y).

SELM-Societa Energia Montedison
(Montedison Group)

Priolo. Feed: naphtha, pyrolysis gasoline, propylene. Products: benzene (350,000 mt/y), cumene (270,000 mt/y), ethylbenzene (70,000 mt/y), orthoxylene (75,000 mt/y), paraxylene (130,000 mt/y), toluene (200,000 mt/y).

SOCIETA CHIMICA DAUNA
(50% EniChem, 50% Snia Viscosa)

Manfredonia, Foggia. Feed: toluene. Product: caprolactam (80,000 t/y).

SOLVAY & CIE. SA

Ferrara. Feed: vinyl chloride monomer. Products: polyvinyl chloride.

Rosignano. Feed: ethylene. Product: hd polyethylene.

TECNOPOLIMERI SpA
(Snia Viscosa group)

Cerlano Laghetto (Milan). Feed: caprolactam, PA66. Product: polyamide (27,000 mt/y).

TERNI INDUSTRIE CHIMICHE SpA

Nera Montoro (Terni). Feed: natural gas. Products: ammonia (120,000 mt/y), urea (100,000 mt/y).

VEDRIL
(Montedison Group)

Rho. Feed: ach. Product: acrylics (65,000 mt/y).

JAPAN

A. G. INTERNATIONAL CHEMICAL CL
(subsidiary of Mitsubishi Gas Chemical Cl)

Mizushima. Feed: m-xylene. Product: isophthalic acid (35,000 mt/y).

ASAHI CHEMICAL INDUSTRY CL

Kawasaki. Products: acrylic esters (20,000 mt/y), acrylonitrile (89,760 mt/y), acrylics (26,950 mt/y), polystyrene (55,200 mt/y), styrene (65,000 mt/y), BR-SBR rubber (129,000 mt/y).

Mizushima. Products: acrylonitrile (128,700 mt/y), ammonia (264,000 mt/y), hd polyethylene (82,000 mt/y), ld polyethylene (96,000 mt/y), polystyrene (145,000 mt/y), styrene (330,000 mt/y), ABS (48,000 mt/y), resins (25,000 mt/y), SB latex (14,000 mt/y).

Nobeoka. Product: nylon 66 (15,000 mt/y).

ASAHI GLASS CL

Chiba. Feed: chlorine, natural gas, propylene. Products: ammonia (46,000 mt/y), propylene glycol (14,000 mt/y), propylene oxide (26,000 mt/y).

Kashima. Feed: chlorine, propylene. Products: propylene glycol (26,000 mt/y), propylene oxide (60,000 mt/y).

ASIA OIL CL

Yokohama. Feed: reformate. Product: benzene (270,000 mt/y).

CHIBA BUTADIENE INDUSTRY CL
(joint venture of Maruzen Petrochemical Co. and Ube Kosan Co.)

Goi-minamikaigan, Chiba. Feed: C_4. Product: butadiene (75,000 mt/y).

CHIBA EDC CL

Chiba. Feed: chlorine, ethylene. Product: ethylene dichloride (80,000 mt/y).

CHIBA VCM CL

Chiba. Feed: ethylene, ethylene dichloride. Product: vinyl chloride (160,000 mt/y).

CHISSO CORP.

Minamata and Mizushima. Feed: acetic acid, ethylene, vinyl chloride monomer. Products: acetic anhydride (5,200 mt/y), polyvinyl chloride (76,000 mt/y).

CHISSO PETROCHEMICAL CORP.

Goi. Feed: ethylene, propylene. Products: oxoalcohols (50,000 mt/y), hd polyethylene (35,000 mt/y), polypropylene (155,700 mt/y), polyvinyl chloride (50,600 mt/y), solvents (44,000 mt/y), plasticizers (53,000 mt/y).

COSMO OIL CL

Matsuyama. Feed: naphtha. Products: benzene (7,000 mt/y), toluene (25,000 mt/y), xylene mix (50,000 mt/y), solvents (50,000 mt/y).

DAICEL CHEMICAL INDUSTRIES LTD.

Aboshi. Feed: acetic acid, methanol. Products: acetic acid (225,000 mt/y), acetic anhydride (120,000 mt/y).

Fuji, Shizuoka. Feed: methanol. Product: formaldehyde (190,000 mt/y).

Ohtake, Hiroshima. Feed: acetaldehyde, naphtha, propylene. Products: acetic acid (36,000 mt/y), solvents (50,000 mt/y), plasticizers (10,000 mt/y).

DAINIPPON INK & CHEMICALS INC.

Amagasaki, Chiba, Sakai, Yokkaichi. Feed: purchased. Products: alkyds (40,000 mt/y), butylenes (20,000 mt/y), formaldehyde (100,000 mt/y), polyamide (3,000 mt/y), polyester (65,000 mt/y), polystyrene (70,000 mt/y).

DENKI KAGAKU KOGYO KABUSHIKI KAISHA

Goi, Chiba Prefecture. Feed: acetic acid, benzene, ethylene, vinyl chloride. Products: ABS (55,000 mt/y), ethylbenzene (185,000 mt/y), polystyrene (113,500 mt/y), polyvinyl chloride (65,000 mt/y), styrene (160,000 mt/y), vinyl acetate (66,000 mt/y).

Ohmi, Niigata Prefecture. Feed: acetic acid, carbide-acetylene, chlorine. Products: polyvinyl alcohol (28,600 mt/y), polyvinyl chloride (24,000 mt/y), vinyl acetate (60,000 mt/y), vinyl chloride (44,000 mt/y).

DU PONT-MITSUI POLYCHEMICALS CL
(50% E.I. du Pont de Nemours & Co., 50% Mitsui Petrochemical Ind. Ltd.)

Chiba. Feed: ethylene. Product: ld polyethylene (100,000 mt/y).

Ohtake. Feed: ethylene. Product: ld polyethylene (42,000 mt/y).

FUJI OIL CL

Sodegaura, Chiba. Feed: naphtha. Product: n-paraffins (10,500 mt/y).

GENERAL PETROCHEMICAL INDUSTRIES LTD.

Osaka. Feed: FCC, reformate. Products: benzene (30,000 mt/y), n-butylene (47,000 mt/y), propylene (65,000 mt/y), TBA (46,000 mt/y), toluene (120,000 mt/y), xylene mix (150,000 mt/y).

IDEMITSU PETROCHEMICAL CL

Chiba. Feed: naphtha. Products: benzene (150,000 mt/y), paraxylene (130,000 mt/y), hd polyethylene (82,000 mt/y), polypropylene (80,000 mt/y), polystyrene (30,000 mt/y), styrene (160,000 mt/y).

Tokuyama. Feed: naphtha. Products: benzene (180,000 mt/y), cyclohexane (90,000 mt/y), ethylene (380,000 mt/y), polystyrene (60,000 mt/y), propylene (220,000 mt/y), styrene (91,000 mt/y—joint ownership with Nippon Zeon), toluene (74,000 mt/y), xylene mix (102,000 mt/y).

JAPAN ALDEHYDE CL

Chiba. Feed: ethylene. Product: acetaldehyde (69,000 mt/y).

JAPAN BUTYL CL

Kashima. Product: butyl rubber (25,000 mt/y).

Kawasaki. Feed: isobutylene, isoprene. Product: butyl rubber (65,000 mt/y).

JAPAN ETHANOL CL

Yokkaichi. Feed: ethylene. Product: ethanol (40,000 mt/y).

JAPAN LACTAM CL

Niihama. Feed: cyclohexene, hydroxylamine. Product: caprolactam (72,000 mt/y).

JAPAN PHENOL CL

Kashima. Feed: cumene. Products: acetone (60,000 mt/y), phenol (100,000 mt/y).

JAPAN PHTHALIC CL

(subsidiary of Mitsubishi Gas Chemical Cl)

Mizushima. Feed: o-xylene. Product: phthalic anhydride (75,000 mt/y).

JAPAN SYNTHETIC ALCOHOL CL

Kawasaki. Feed: ethylene. Product: ethanol (40,000 mt/y).

JAPAN SYNTHETIC RUBBER CL

Chiba. Feed: butadiene. Products: polybutylene resins (10,000 mt/y), polybutadiene rubber (50,000 mt/y).

Kashima. Feed: C_4-C_5 streams. Products: butadiene (50,000 mt/y), isoprene (30,000 mt/y), polyisoprene (30,000 mt/y).

Yokkaichi. Feed: acrylonitrile, C_4 stream, ethylene, propylene, styrene. Products: butadiene (95,000 mt/y), ABS (97,000 mt/y), AES (10,000 mt/y), polybutadiene (25,000 mt/y), EPR (40,000 mt/y), SB latex (65,000 mt/y), SBR, HSR, NBR (255,000 mt/y).

KASHIMA VINYL CHLORIDE MONOMER CL

Kashima. Feed: ethylene. Product: vinyl chloride (270,000 mt/y).

KAWASAKI KASEI CHEMICALS LTD.

Kawasaki. Feed: crude naphthalene, orthoxylene, oxoalcohols, phthalic anhydride. Products: naphthalene (12,000 mt/y), phthalic anhydride (72,000 mt/y), plasticizers (57,000 mt/y),

KURARAY CL

Kashima. Feed: butene, butane. Products: isoprene (30,000 mt/y).

Okayama. Feed: ethylene. Products: polyvinyl alcohol (225 mt/d).

Nakajo. Feed: ethylene. Product: polyvinyl alcohol (120 mt/d).

KURARAY YUKA CL

Yokkaichi City. Feed: paraxylene. Product: terephthalic acid (53,000 mt/y).

KYODO SAKUSAN CL

(subsidiary of Daicel Chemical Industries Ltd.)

Aboshi, Himeji, Hyogo. Feed: methanol. Product: acetic acid (225,000 mt/y).

KYOWA YUKA CL

Yokkaichi. Feed: ethylene, propylene. Products: acetaldehyde (125,000 mt/y), acetone (36,000 mt/y), butanol (60,000 mt/y), butyraldehyde (180,000 mt/y), oxoalcohols (100,000 mt/y), plasticizers (100,000 mt/y).

MARUZEN PETROCHEMICAL CL

Ichihara, Chiba. Feed: naphtha. Products: benzene (120,000 mt/y), butadiene (55,000 mt/y), ethylene (373,000 mt/y), propylene (220,000 mt/y), toluene (69,000 mt/y), xylene mix (51,000 mt/y).

MITSUBISHI CHEMICAL INDUSTRIES LTD.

Kurosaki. Feed: coal, LPG, naphtha. Products: ammonia (264,000 mt/y), caprolactam (84,000 mt/y), carbon black (36,000 mt/y), dimethyl terephthalate (60,000 mt/y), nylons (15,000 mt/y), terephthalic acid (270,000 mt/y), urea (264,000 mt/y).

Mizushima. Feed: naphtha, LPG. Products: acetaldehyde (120,000 mt/y), acetone (55,000 mt/y), acrylonitrile (112,000 mt/y), alphaolefins (25,000 mt/y), benzene (200,000 mt/y), butanol (25,000 mt/y), cyclohexane (100,000 mt/y), maleic anhydride (18,000 mt/y), oxoalcohols (146,000 mt/y), orthoxylene (27,000 mt/y), paraxylene (50,000 mt/y), ld polyethylene (58,000 mt/y), hd polyethylene (69,000 mt/y), polypropylene (35,000 mt/y), toluene (60,000 mt/y), vinyl chloride (250,000 mt/y), xylene mix (30,000 mt/y).

Yokkaichi. Feed: butadiene, styrene. Products: carbon black (92,000 mt/y), SBR (65,000 mt/y).

MITSUBISHI GAS CHEMICAL CI

Mizushima. Feed: mixed xylene. Products: ethylbenzene (60,000 mt/y), maleic anhydride (3,700 mt/y), metaxylene (30,000 mt/y), orthoxylene (90,000 mt/y), paraxylene (120,000 mt/y), xylene mix (240,000 mt/y).

Niigata. Feed: natural gas. Products: ammonia (211,200 mt/y), formaldehyde (220,000 mt/y), methanol (396,000 mt/y), urea (198,000 mt/y).

MITSUBISHI MONSANTO CHEMICAL CO.

Yokkaichi. Feed: acrylonitrile, styrene, SBR. Products: acrylonitrile-styrene (32,000 mt/y), ABS (60,000 mt/y), polystyrene (160,000 mt/y).

MITSUBISHI PETROCHEMICAL CL

Kashima. Feed: naphtha. Products: benzene (175,000 mt/y), cumene (140,000 mt/y), ethylene (299,000 mt/y), melamine (30,000 mt/y), ld polyethylene (135,000 mt/y), polypropylene (120,000 mt/y), styrene (160,000 mt/y), xylene mix (41,000 mt/y).

Yokkaichi. Feed: naphtha. Products: acrylic acid-esters (40,000 mt/y), alkylbenzene (65,000 mt/y), benzene (221,000 mt/y), ethylene (210,700 mt/y), ethylene glycol (86,000 mt/y), ethylene oxide (80,000 mt/y), oxoalcohols (30,000 mt/y), ld polyethylene (50,000 mt/y), polypropylene (70,000 mt/y), styrene (150,000 mt/y), toluene (48,000 mt/y), xylene (13,000 mt/y).

MITSUBISHI YUKA BADISCHE CL

(joint venture of BASF and Mitsubishi Petrochemical CL)

Yokkaichi. Feed: styrene. Products: expandable polystyrene (64,000 mt/y).

MITSUI PETROCHEMICAL INDUSTRIES LTD.

Chiba. Feed: benzene, ethylene, propylene. Products: acetone (108,000 mt/y), aniline (30,000 mt/y), benzene (93,000 mt/y), butanol (53,000 mt/y), butylenes (22,000 mt/y), ethylene glycol (92,000 mt/y), ethylene oxide (92,000 mt/y), phenol (180,000 mt/y), hd polyethylene (164,100 mt/y), polypropylene (140,000 mt/y), resins (20,000 mt/y), toluene (54,000 mt/y), xylene mix (44,000 mt/y), ethylene-propylene rubber (30,000 mt/y).

Iwakuni-Ohtake. Feed: benzene, ethylene, paraxylene, propylene. Products: acetaldehyde (36,000 mt/y), acetone (36,000 mt/y), benzene (62,000 mt/y), phenol (30,000 mt/y). hd polyethylene (4,200 mt/y), ld polyethylene (45,000 mt/y), lm polyethylene (4,000 mt/y), resins (34,000 mt/y), solvents (9,100 mt/y), terephthalic acid (270,000 mt/y), crude terephthalic acid (320,000 mt/y), toluene (46,000 mt/y), xylene mix (39,000 mt/y)

MITSUI TOATSU CHEMICALS INC.

(Licensee of Witco Corp.—Concarb Div.)

Shimonoseki. Feed: heavy aromatic oil, coal tar distillate. Product: carbon black (30,000 mt/y).

Yokoshiba. Feed: heavy aromatic oil, coal tar distillate. Product: carbon black (45,000 mt/y).

MIZUSHIMA AROMA CL

(subsidiary of Mitsubishi Gas Chemical Cl).

Mizushima. Feed: paraxylene. Products: terephthalic acid (115,000 mt/y).

MIZUSHIMA ETHYLENE KK

(50% Mitsubishi Chemical Industries, 50% Sanyo Petrochemicals).

Mizushima. Feed: LPG, naphtha. Products: ethylene (360,000 mt/y), propylene (216,000 mt/y).

NIHON ALKYLATE CL

(Sumitomo Chemical Co. and Kao Soap Co.).

Niihama. Feed: benzene. Product: linear alkylbenzene (34,000 mt/y).

NIHON OXIRANE CL

(Atlantic Richfield, Sumitomo Chemical, Showa Denko).

Chiba. Feed: ethylbenzene, propylene. Products: propylene oxide (90,000 mt/y), styrene (225,000 mt/y).

NIHON POLYSTYRENE CL

Kawasaki. Feed: styrene. Product: polystyrene (58,000 mt/y).

NIPPON CARBIDE INDUSTRIES CI

Toyama. Feed: vinyl chloride monomer. Product: acrylics, polyvinyl chloride (1,500 mt/y).

NIPPON KASEI CHEMICAL CL

Onahama, Fukushima. Feed: creosote oil, methanol. Products: carbon black (28,000 mt/y), formaldehyde (96,000 mt/y).

NIPPON MINING CL

Mizushima. Product: n-paraffins (80,000 mt/y), polypropylene (100,000 mt/y-includes Nagoya).

Nagoya. Products: benzene (112,000 mt/y), cyclohexane (80,000 mt/y), paraxylene (100,000 mt/y), xylene mix (123,000 mt/y).

NIPPON OIL AND FATS CO.

Oita. Feed: C_4 cut, C_4 LPG. Products: isoparaffins (1,200 mt/y), maleic anhydride (12,000 mt/y), polybutene (8,000 mt/y).

NIPPON PETROCHEMICALS CL

Kawasaki and Ukishima. Feed: LPG, naphtha. Products: benzene (72,000 mt/y), butadiene (60,000 mt/y), isopropanol (60,000 mt/y), n-paraffins (55,000 mt/y), ld polyethylene (95,000 mt/y), hd polyethylene (100,000 mt/y), polyisobutylene (2,000 mt/y), toluene (42,000 mt/y), xylene (34,000 mt/y).

NIPPON PETROLEUM DETERGENT CL

(55% Nippon Petrochemicals Co., 45% Chevron Chemical Co.)

Kawasaki. Feed: benzene, n-paraffin, propylene. Product: alkylbenzene (85,000 t/y).

NIPPON POLYURETHANE INDUSTRIAL CL

Shin-Nanyo, Yamaguchi. Product: polyester (7,200 t/y).

NIPPON SHOKUBAI KAGAKU KOGYO CL

Himeji. Feed: benzene, naphthalene, orthoxylene, propylene. Products: acrylic acid-acrylic esters (60,000 mt/y), maleic anhydride (36,000 mt/y), phthalic anhydride (80,000 mt/y).

Kawasaki. Feed: ethylene. Products: ethylene glycol (185,000 mt/y), ethylene oxide (185,000 mt/y).

Suita. Feed: ethylene glycols, phthalic anhydride, styrene. Product: alkyds, polyester (48,000 mt/y).

NIPPON ZEON CL

Kawasaki. Feed: acrylonitrile, butadiene, styrene. Products: NBR (30,000 mt/y), SBR (30,000 mt/y).

Mizushima. Feed: vinyl chloride. Product: polyvinyl chloride (130,000 mt/y).

Takaoka. Feed: vinyl chloride. Product: polyvinyl chloride (80,000 mt/y).

Tokuyama. Feed: C_4 stream. Products: butadiene (140,000 mt/y), polybutylene (48,000 mt/y), EBR (10,000 mt/y), SBR-NBR-HS (190,000 mt/y)

NISSAN CHEMICAL INDUSTRIES LTD.

Toyama. Feed: LPG, naphtha. Products: ammonia (113,000 mt/y), melamine (42,000 mt/y), urea (127,000 mt/y).

NISSAN MARUZEN POLYETHYLENE CL

Goi, Chiba. Feed: ethylene. Product: hd polyethylene (70,000 mt/y).

NISSAN NALKEN CORP.

Chiba, Pref. Feed: benzene, n-paraffin. Product: alkylbenzene (40,000 mt/y).

NISSAN PETROCHEMICAL LTD.

Goi, Chiba. Feed: ethylene, olefins, propylene. Products: oxoalcohols (80,000 mt/y), polyvinyl chloride (55,000 mt/y), vinyl chloride (60,000 mt/y).

NISSO MARUZEN CHEMICAL CL

Goi, Ichihara. Feed: ethylene, propylene oxide. Products: ethylene glycol (70,000 mt/y), ethylene oxide (70,000 mt/y), propylene glycol (22,000 mt/y).

NISSO PETROCHEMICAL INDUSTRIES CL.

Yokkaichi. Feed: ethylene. Products: ethylene glycol (60,000 mt/y), ethylene oxide (60,000 mt/y).

OKAYAMA BUTADIENE CL

(Joint venture of Nippon Zeon CL and Asahi Chemical Industry CL).

Mizushima. Feed: C_4 stream. Product: butadiene (140,000 mt/y).

OSAKA GAS CL

Osaka. Feed: coke oven gas oil. Products: benzene (80,000 mt/y), naphthalene (11,000 mt/y), toluene (10,000 mt/y).

OSAKA PETROCHEMICAL INDUSTRIES LTD.

Takaishi, Osaka. Feed: LPG, naphtha. Products: aromatics (225,000 mt/y), benzene (100,000 mt/y), ethylene (300,000 mt/y), propylene (200,000 mt/y), toluene (65,000 m/ty), xylene mix (60,000 mt/y).

SANYO ETHYLENE CL

Mizushima. Feed: naphtha. Products: ethylene (390,000 mt/y), propylene (254,000 mt/y).

SANYO MONOMER CL

(joint venture of Nippon Zeon CL, Asahi Chemical Co., Chisso Corp.)

Mizushima. Feed: ethylene, chlorine. Products: vinyl chloride (175,000 mt/y).

SEITETSU KAGAKU CL

Befu. Products: formaldehyde (32,400 mt/y).

Himeji. Products: formaldehyde (107,000 mt/y), methanol (165,000 mt/y).

SENBOKU POLYMER CL

(50% Mitsui Toatsu 35% Nippon Petrochemicals, 15% Asahi Chemicals).

Osaka. Product: polypropylene (80,000 mt/y).

SHIN-DAIKYOWA PETROCHEMICAL CL

(Daikyo Oil CL, Toyo Soda Mfg. CL, Kyowa Hakko Kogyo CL, Dainippon Ink and Chemicals Inc., Industrial Bank of Japan).

Yokkaichi. Feed: naphtha. Products: aromatics (124,000 mt/y), benzene (90,000 mt/y), butadiene (44,000 mt/y), cumene (140,000 mt/y), ethylene (300,000 mt/y), ethylbenzene (130,000 mt/y), propylene (160,000 mt/y), styrene (91,000 mt/y), toluene (60,000 mt/y), xylene mix (50,000 mt/y).

SHIN-ETSU CHEMICAL CL

Kashima. Feed: vinyl chloride. Product: polyvinyl chloride (198,000 mt/y).

Shin-Nanyo. Feed: vinyl chloride. Product: polyvinyl chloride (42,000 mt/y).

SHIN-ETSU VINYL ACETATES CL

Sakai. Feed: acetic acid, ethylene. Product: vinyl acetate (80,000 mt/y).

SHOWA ACETYL CHEMICAL CL

Ohita. Feed: ethylene. Products: acetaldehyde (100,000 mt/y), acetic acid (130,000 mt/y), vinyl acetate (80,000 mt/y).

SHOWA DENKO KK

Kawasaki. Feed: propylene. Products: acrylonitrile (51,200 mt/y), ammonia (197,200 mt/y), propylene glycol (10,000 mt/y), propylene oxide (31,000 mt/y).

Ohita. Feed: naphtha. Products: aromatics (160,000 mt/y), butadiene (45,000 mt/y), ethylene (320,000 mt/y), ld polyethylene (70,000 mt/y), hd polyethylene (112,700 mt/y), polypropylene (91,600 mt/y), propylene (170,000 mt/y).

SUMITOMO CHEMICAL CL

Chiba. Feed: butane, naphtha. Products: benzene (100,000 mt/y), ethylene (345,000 mt/y), ld polyethylene (164,000 mt/y), polypropylene (144,000 mt/y), polyvinyl chloride (52,800 mt/y), propylene (252,000 mt/y), toluene (60,000 mt/y), xylene (40,000 mt/y), SBR (50,000 mt/y), ethylene-propylene rubber (35,000 mt/y).

Niihama. Feed: butane, naphtha. Products: acrylic acid-esters (32,000 mt/y), acrylonitrile (52,000 mt/y), polyvinyl chloride (26,700 mt/y).

SUN ARROW CHEMICAL CL

(Tokuyama Soda CL)

Tokuyama. Feed: ethylene dichloride. Products: polyvinyl chloride (85,000 mt/y), vinyl chloride (180,000 mt/y).

TAKEDA CHEMICAL INDUSTRIES LTD.

Kashima. Feed: benzene. Product: maleic anhydride (16,500 t/y).

Shimizu. Feed: butadiene, styrene maleic anhydride, propylene glycol. Products: polyester (27,500 mt/y), SBR (20,000 mt/y).

TEIJIN HERCULES CHEMICAL CL

Ehime. Feed: paraxylene. Product: dimethyl terephthalate (140,000 mt/y).

Matsuyama Feed: paraxylene. Product: dimethyl terephthalate (60,000 mt/y),.

Tokuyama. Feed: paraxylene. Product: dimethyl terephthalate (75,000 mt/y).

TEIJIN PETROCHEMICAL INDUSTRIES LTD.

Ehime. Feed: mixed xylenes. Products: orthoxylene (30,000 mt/y), paraxylene (170,000 mt/y).

Tokuyama. Feed: mixed xylene. Products: ethylbenzene (20,000 mt/y), orthoxylene (30,000 mt/y), paraxylene (35,000 mt/y).

TOHO RIKA KOGYO KK

Minato, Nagoya. Feed: methanol, orthoxylene. Product: formaldehyde (80,000 mt/y), phthalic anhydride (30,000 mt/y).

TOKUYAMA PETROCHEMICAL CL

Shin-Nanyo. Feed: ethylene. Products: acetaldehyde (100,000 mt/y), butanol (13,000 mt/y).

TOKUYAMA SODA CL

Tokuyama. Feed: propylene. Products: ethylene dichloride (132,000 mt/y), isopropanol (36,000 mt/y), polypropylene (95,000 mt/y), propylene oxide (36,000 mt/y).

TOKUYAMA STYRENE MONOMER CL

(jointly owned by Idemitsu Petrochemical CL, and Nippon Zeon CL)

Tokuyama. Feed: benzene, ethylene. Product: styrene (91,000 mt/y).

TOMAKOMAI SODA CL

(Nippon Zeon, Hokkaido Soda, Maruzen Petrochemical, Nippon Light Metal, Nissho Iwai, Asahi Denka)

Tomakomai. Feed: ethylene. Product: ethylene dichloride (120,000 mt/y).

TONEN PETROCHEMICAL CL

Kawasaki. Feed: naphtha, LPG. Products: butadiene (105,000 mt/y), butanol (7,700 mt/y), ethylene (350,000 mt/y), hd polyethylene (36,800), propylene (224,000 mt/y), polypropylene (76,000 mt/y).

Wakayama. Feed: reformate. Products: benzene (40,000 mt/y), orthoxylene (65,000 mt/y), paraxylene (90,000 mt/y), toluene (80,000 mt/y).

TOUBU BUTADIENE CL

(50% Japan Synthetic Rubber, 50% Sumitomo Chemical)

Chiba. C_4 streams. Product: butadiene (80,000 mt/y).

TOYO CONTINENTAL CARBON LTD.

(subsidiary of Witco Corp.)

Shimonoseki. Feed: heavy aromatic oils. Product: carbon black (15,000 mt/y).

Yokoshiba. Feed: heavy aromatic oils. Product: carbon black (45,000 mt/y).

TOYO SODA MANUFACTURING CL

Tokuyama. Feed: ethylene. Products: ammonia (57,000 mt/y), polyethylene ([illegible] mt/y), polyvinyl chloride (12,500 mt/y) vinyl chloride (171,600 mt/y), rubber (20,000 mt/y).

Yokkaichi. Feed: ethylene. Products: polyethylene (86,000 mt/y), polyvinyl chloride (98,000 mt/y), vinyl chloride (127,400 mt/y).

UBE INDUSTRIES LTD.

Ichihara, Chiba. Feed: butadiene, ethylene. Products: polybutadiene (60,000 mt/y), ld polyethylene (101,000 mt/y).

Sakai, Osaka. Feed: benzene, LPG, LNG, naphtha, propylene. Products: ammonia (234,600 mt/y), caprolactam (90,000 mt/y), cyclohexane (100,000 mt/y), polypropylene (105,000 mt/y), urea (95,200 mt/y).

Ube, Yamaguchi. Feed: benzene. Products: caprolactam (90,000 mt/y), cyclohexane (58,000 mt/y), nylon 6 (24,600 mt/y), nylon 66 (2,400 mt/y), nylon 12 (2,400 mt/y).

UKISHIMA AROMATIC CHEMICALS CL

(50% Nippon Petrochemicals CL, 50% Toray Industries Inc.)

Ukishima. Feed: naphtha, reformate. Products: cyclohexane (150,000 mt/y), orthoxylene (30,000 mt/y), paraxylene (150,000 mt/y).

UKISHIMA PETROCHEMICALS CL

(50% Nippon Petrochemicals CL, 50% Mitsui Petrochemical Industries)

Chiba and Ukishima. Feed: naphtha. Products: ethylene (808,000 mt/y), propylene (417,000 mt/y).

UNITIKA CHEMICAL CO.

Sakai. Feed: vinyl chloride. Product: polyvinyl alcohol (24,000 mt/y).

YUKA MELAMINE CL

Kashima. Feed: urea. Product: melamine (30,000 mt/y).

ZEON ISOPRENE CL

(Subsidiary of Nippon Zeon)

Mizushima. Feed: C_5 stream, isoprene. Products: isoprene (45,000 mt/y), polyisoprene (37,000 mt/y), C_5 resin.

JORDAN

INTERMEDIATES PETROCHEMICALS INDUSTRIES CL

Zarqa. Feed: glycols, maleic-phthalic anhydrides, oxoalcohols, polyvinyl chloride, styrene. Products: polyesters (8,000 mt/y), plasticizers (4,000 mt/y).

KOREA

DAINONG PETROCHEMICAL INDUSTRY CL
(joint venture Dainong CL, Mitsui Toatsu Chemicals Inc., Toyo Menka Kaisha Ltd.)

Ulsan. Feed: benzene. Product: maleic anydride (12,000 mt/y).

HANKOOK CAPROLACTAM CORP.

Ulsan. Feed: cyclohexane. Product: caprolactam (40,000 mt/y).

HANNAM CHEMICAL CORP.

Ulsan. Feed: acrylonitrile, butadiene, propylene oxide, styrene. Product: ABS (30,000 mt/y), polystyrene (150,000 mt/y).

HONAM ETHYLENE CL

Yeo-Chon. Feed: C_4, gas oil, LPG, naphtha. Products: benzene (74,000 mt/y), butadiene—as mixed C_4s (129,000 mt/y), ethylene (350,000 mt/y), propylene (187,000 mt/y), toluene (44,000 mt/y), xylene mix (30,000 mt/y).

ISU CHEMICAL CL

Ulsan. Feed: benzene, n-paraffin, propylene tet. Products: alkylbenzene (20,000 mt/y), linear alkylbenzene (50,000 mt/y).

KOREA FERTILIZER CL

Ulsan. Feed: naphtha. Products: ammonia (195,000 mt/y), melamine (6,000 mt/y), urea (330,000 mt/y).

KOREA KUMHO PETROCHEMICAL CL

Ulsan and Yeochun. Feed: C_4, butadiene, styrene. Products: acetone (15,000 mt/y), butadiene (70,000 mt/y), cumene (35,000 mt/y), phenol (25,000 mt/y), polybutadiene (30,000 mt/y), SBR (130,000 mt/y).

KOREA PETROCHEMICAL INDUSTRIES CL

Ulsan. Feed: ethylene, propylene. Products: hd polyethylene (70,000 mt/y), polypropylene (120,000 mt/y).

KOREA PLASTIC INDUSTRY CORP.

Chinhae, Kunsan, Ulsan. Feed: vinyl chloride. Product: polyvinyl chloride (215,000 mt/y), plasticizers (20,000 mt/y).

KOREA POLYOL CL

Ulsan. Feed: ethylene oxide, propylene oxide. Products: polypropylene glycol (40,000 mt/y), ethylene oxide (5,000 mt/y), polyethylene glycol (1,000 mt/y).

LUCKY ADVANCED MATERIALS INC.
(Licensee of Witco Corp.—Concarb Div.)

Bupyong. Feed: heavy aromatic oil, coal tar distillate. Product: carbon black (30,000 mt/y).

Yosu. Feed: heavy aromatic oil, coal tar distillate. Product: carbon black (65,000 mt/y).y).

LUCKY LTD.

Na-Ju. Products: butanol (10,000 mt/y), oxoalcohols (55,000 mt/y), plasticizers (36,000 mt/y).

Yeo-Chon. Products: ABS (75,000 mt/y), polystyrene-SAN (75,000 mt/y), polyvinyl chloride (250,000 mt/y).

NAMHAE CHEMICAL CORP.

Yosu, Chunnam. Feed: naphtha. Products: ammonia (600,000 mt/y), urea (660,000 mt/y).

SAMKYUNG CHEMICAL CL

Ulsan. Feed: butanol, orthoxylene, phthalic anhydride, 2-ethyl hexanol. Product: phthalic anhydride (40,000 mt/y), plasticizers (30,000 mt/y).

TONG SUH PETROCHEMICAL CORP. LTD.

Ulsan. Feed: ammonia, propylene. Product: acrylonitrile (83,000 mt/y).

YONG-NAM CHEMICAL CL

Ulsan. Feed: naphtha. Product: ammonia (310 mt/d), urea (375 mt/d).

YUKONG LTD.

Ulsan. Feed: naphtha. Products: benzene (160,000 mt/y), butadiene (24,000 mt/y), cyclohexane (38,000 mt/y), ethylene (155,000 mt/y), propylene (81,000 mt/y), toluene (210,000 mt/y), xylene mix (330,000 mt/y).

KUWAIT

PETROCHEMICAL INDUSTRIES CO.

Shualba. Feed: natural gas. Products: ammonia (3,000 mt/d), urea (2,400 mt/d).

MADAGASCAR

N-REN CORP.

Tamatave. Feed: naphtha. Product: ammonia (175 mt/d).

ZE-REN

Tamatave. Product: urea (90,000 mt/y).

MALAYSIA

BORDEN CHEMICAL

Prai. Feed: phenol, methanol, urea. Products: formaldehyde (15,000 mt/y), resins.

ESSO MALAYA BERHAD

Port Dickson. Feed: refinery gas, naphtha. Product: ammonia (53,000 mt/y).

MALAYSIAN CARBON SDN. BHD.
(Subsidiary of Cabot Corp.)

Port Dickson. Feed: heavy aromatic oil. Product: carbon black.

MEXICO

CELANESE MEXICANA SA

Cangrejera. Products: acetic acid (108,000 mt/y), acetic anhydride (33,000 mt/y), acetone (60,000 mt/y), butanol (16,000 mt/y), butyraldehyde (90,000 mt/y), vinyl acetate (25,000 mt/y).

Celaya. Products: acetic acid (63,000 mt/y), acetic anhydride (31,000 mt/y), acetone (14,000 mt/y), butanol-n (38,000 mt/y), 2-ethyl hexanol (70,000 mt/y), vinyl acetate (25,000 mt/y).

Cosoleacaque. Product: acrylic acid-esters (16,000 mt/y).

Lerma. Products: phthalic anhydride (23,500 mt/y), solvents-plasticizers (10,100 mt/y).

Ocotlan. Products: polyamide (16,860 mt/y), polyester (9,900 mt/y).

Queretaro. Products: polyamide (7,000 mt/y), polyester (94,000 mt/y).

Toluca. Products: polyamide (12,000 mt/y), polyester (23,600 mt/y).

DERIVADOS MALEICOS SA DE CV

Puebla. Feed: benzene. Product: maleic anhydride (7,000 mt/y).

FENOQUIMIA SA
(50-50 Celanese Mexicana and Industrias Resistol)

Cosoleacaque, Ver. Feed: cumene, methanol. Products: acetone (23,000 mt/y), acrylics (16,000 mt/y), phenol (38,000 mt/y).

FERTILIZANTES MEXICANOS SA

Camargo. Feed: ammonia, CO_2. Product: urea (75,000 mt/y).

Coatzacoalcos (Pajaritos). Feed: ammonia, carbon dioxide. Product: urea (990,000 mt/y)

Minatitlan. Feed: ammonia, carbon dioxide. Product: urea (302,000 mt/y).

Salamanca. Feed: ammonia, carbon dioxide. Product: urea (386,000 mt/y).

GLICOLES MEXICANOS SA DE CV

Apizaco, Tlaxcala. Feed: ethylene oxide. Product: ethylene glycol (100,000 mt/y).

HULES MEXICANOS SA
(owned by Pemex and Polysar Ltd.)

Altamira, Tam. Feed: styrene, butadiene, acn. Product: SBR (45,000 mt/y).

INDUSTRIAS DERIVADAS DEL ETILENO SA

Puebla, Pue. Feed: ethylene oxide, propylene oxide. Product: ethylene glycol (30,000 mt/y), propylene glycol (l0,000 mt/y).

INDUSTRIAS RESISTOL SA

Coatzacoalcos. Product: polystyrene (40,000 mt/y).

Locheria. Products: ABS-polystyrene-SAN (26,000 mt/y), SBR (4,380 mt/y).

Lerma. Feed: butadiene, methanol, styrene monomer. Products: formaldehyde (34,250 mt/y), SBR (10,500 mt/y).

Xicohtzingo. Products: polystyrene (20,000 mt/y).

NEGROMEX SA

Salamanca. Feed: aromatic oils, butadiene, styrene. Products: carbon black (49,600 mt/y), rubber (70,000 mt/y).

PETROCEL SA

Altamira, Tampa. Feed: methanol, paraxylene. Products: dimethyl terephthalate (242,000 mt/y), terephthalic acid (55,000 mt/y).

PETROLEOS MEXICANOS

Azcapotzalco. Feed: benzene, propylene tet, refinery gas. Products: alkylbenzene (36,500 mt/y), propylene (27,000 mt/y), propylene tet (17,500 mt/y).

Cadereyta, N.L. Feed: refinery gas. Product: propylene (45,000 mt/y).

Camargo. Chihuahua. Feed: natural gas. Products: ammonia (132,000 mt/y).

Cangrejera, Veracruz. Feed: benzene, ethylene, naphtha, propylene. Product: acetaldehyde (100,000 mt/y), aromatics mix (22,000 mt/y), benzene (275,000 mt/y), cumene (40,000 mt/y), ethylbenzene (187,000 mt/y), ethylene (500,000 mt/y), ethylene oxide (100,000 mt/y), metaxylene-paraxylene (360,000 mt/y), orthoxylene (55,000 mt/y), paraxylene (240,000 mt/y), ld polyethylene (240,000 mt/y), propylene (26,900 mt/y), styrene (150,000 mt/y), toluene (365,000 mt/y), xylene mix (43,000 mt/y).

Ciudad Madero, Tamaulipas. Feed: benzene, butylenes, ethylene, propylene, refinery gas. Products: alkylbenzene (31,600 mt/y), butadiene (55,000 mt/y), ethylbenzene (39,400 mt/y), propylene (61,000 mt/y), propylene tet (19,000 mt/y), styrene (30,000 mt/y).

Cosoleacaque, Veracruz. Feed: natural gas, propylene. Products: acrylonitrile (24,000 mt/y), ammonia (2,350,000 mt/y), paraxylene (40,000 mt/y).

Minatitlan, Veracruz. Feed: benzene, ethylene, naphtha, refinery gas. Products: aromatics mix (44,000 mt/y), benzene (124,250 mt/y), cyclohexane (106,000 mt/y), ethylbenzene (17,550 mt/y), meta para xylene (40,610 mt/y), orthoxylene (11,250 mt/y), propylene (33,000 mt/y), toluene (100,000 mt/y).

Pajaritos, Veracruz. Feed: ethylchloride, ethylene. Products: acetaldehyde (44,000 mt/y), ethylene (209,210 mt/y), ethylchloride (414,050 mt/y), ethylene oxide (28,000 mt/y), vinyl chloride (270,000 mt/y).

Poza Rica, Veracruz. Feed: ethylene. Products: ethylene (182,000 mt/y), ld polyethylene (51,000 mt/y), hd polyethylene (100,000 mt/y), propylene (9,400 mt/y).

Reynosa, Tamaulipas. Feed: ethylenc. Products: ethylene (27,210 mt/y), ld polyethylene (18,000 mt/y).

Salamanca, Guanajuato. Feed: natural gas, propylene. Products: ammonia (379,000 mt/y), isopropanol (15,000 mt/y), propylene (48,000 mt/y).

Salina Cruz, Oax. Feed: refinery gas. Product: propylene (45,000 mt/y).

San Martin, Texmelucan, Puebla. Feed: benzene, natural gas, propylene tet. Products: alkylbenzene (70,000 mt/y), methanol (171,500 mt/y), propylene tet (80,000 mt/y).

Tula, Hidalgo. Feed: ammonia, natural gas, propylene. Products: acrylonitrile (50,000 mt/y), propylene (45,000 mt/y).

POLICYD SA
Mexico City and Tampico. Feed: vinyl chloride monomer. Product: polyvinyl chloride (115,000 mt/y).

POLIMEROS DE MEXICO SA
Moyotzingo, Puebla. Feed: vinyl chloride monomer. Product: polyvinyl chloride (30,000 mt/y).

POLIOLES SA DE CV
(Mexican shareholders and BASF Wyandotte Corp.)
Lerma (State of Mexico). Feed: ethylene oxide, propylene oxide. Products: ethylene glycol, propylene oxide.

POLIVIN SA DE CV
Celaya, Guanajuato. Feed: vinyl acetate. Product: polyvinyl alcohol (2,400 mt/y).

SÍNTESIS ORGÁNICAS SA
Puebla, Pue. Feed: orthoxylene, 2 ethylhexanol. Products: phthalic anhydride (42,000 mt/y).

UNIVEX SA
(DSM affiliate)
Salamanca, Gto. Product: caprolactam (50,000 mt/y).

MOROCCO

SNEP—Societe Nationale d'Electrolyse et de Petrochemie.
Mohammedia. Products: polyvinyl chloride (25,000 mt/y), vinyl acetate (25,000 mt/y).

NETHERLANDS

AKZO ZOUT CHEMIE NEDERLAND BV
Botlek. Feed: ethylene, chlorine, HCl. Product: vinyl chloride (500,000 mt/y).

AMMONIAKUNIE BV
(½ DSM, ½ BASF).
Rotterdam. Feed: natural gas. Product: ammonia (390,000 mt/y).

ARCO CHEMIE NEDERLAND LTD.
(100% Arco Chemical Co.)
Rotterdam. Feed: isobutane and propylene. Product: butanol (150,000 mt/y), isobutylenes (60,000 mt/y), propylene glycol (50,000 mt/y), propylene oxide (180,000 mt/y).

BREDASE POLYSTYREEN MBV.
Breda. Feed: styrene. Product: polystyrene (150,000 mt/y).

CINDU CHEMICALS BV
Uithoorn (near Amsterdam). Feed: coal tar. Products: carbon black feedstock (10,000 mt/y), naphthalene (10,000 mt/y).

DEGUSSA
Botlek. Feed: aromatic hydrocarbons, coal tar oil. Product: carbon black.

DOW CHEMICAL EUROPE
Terneuzen. Products: benzene, butadiene, cumene, ethylene, ethylbenzene, ethylene glycol, ethylene oxide, ld-lld polyethylene, polystyrene, propylene, SB-latex, styrene.

DSM
Chemical Products Division
South Limburg. Products: acetylene (2,200 mt/y), acrylonitrile (175,000 mt/y), caprolactam (230,000 mt/y), melamine (60,000 mt/y).
Chemische Industrie Rijnmond
Botlek. Feed: toluene. Product: phenol (160,000 mt/y).
Methanol Chemie Nederland VoF
Deltzijl and Rotterdam. Products: formaldehyde (120,000 mt/y), resins (200,000 mt/y).
Methanor VoF.
Delfzijl. Product: methanol (740,000 mt/y).
Plastics Division
South Limburg. Feed: C_4, C_5, naphtha, gas oil. Products: benzene (160,000 mt/y), butadiene (110,000 mt/y), ethylene-propylene rubber (50,000 mt/y), ethylene (800,000 mt/y), MTBE (100,000 mt/y), ld polyethylene (370,000 mt/y), hd polyethylene (150,000 mt/y), polypropylene (125,000 mt/y), polyvinyl chloride (180,000 mt/y), propylene (450,000 mt/y), ABS (50,000 mt/y).

DSM FERTILIZERS
Geleen. Feed: natural gas. Products: ammonia (480,000 mt/y), urea 500,000 mt/y).
IJmuiden. Feed: natural gas. Product: ammonia (350,000 mt/y).

HOECHST HOLLAND NV
Vlissingen. Feed: p-xylene, methanol. Product: dimethyl terephthalate (85,000 mt/y).

ICI HOLLAND BV
Rozenburg. Product: polypropylene (100,000 mt/y).

KEMIRA BV
(subsidiary of Kemira Oy)
Rozenburg. Feed: natural gas. Products: ammonia (530,000 mt/y), urea (230,000 mt/y).

NEDERLANDSE STIKSTOF MAATSCHAPPIJ BV
Sluiskil. Feed: natural gas. Products: ammonia (1,250,000 mt/y), urea (780,000 mt/y).

POLYSAR NEDERLAND BV
Arnhem. Feed: acrylonitrile, acrylic monomers, butadiene, styrene, vinyl chloride. Product: acrylic, SBR, PVC, nitrile latexes (60,000 mt/y).

SHELL NEDERLAND CHEMIE BV
Moerdijk. Feed: gas oil, LPG, naphtha. Products: butadiene (115,000 mt/y), ethylbenzene (360,000 mt/y), ethylene (525,000 mt/y), ethylene glycol (130,000 mt/y), ethylene oxide (190,000 mt/y), propylene (300,000 mt/y), propylene oxide (125,000 mt/y), styrene (330,000 mt/y).
Pernis. Feed: naphtha. Products: acetone (150,000 mt/y), bisphenol A (60,000 mt/y), isopropanol (290,000 mt/y), polypropylene (90,000 mt/y), polyvinyl chloride (200,000 mt/y), propylene (115,000 mt/y), SBR (150,000 mt/y).

UCAM VOF
(2/3 DSM, 1/3 Kemira)
Geleen. Feed: natural gas. Product: ammonia (460,000 mt/y).

NEW ZEALAND

PETROCORP
Taranaki, Kapuni. Feed: natural gas. Products: ammonia (270 mt/d), urea (470 mt/d).
Taranaki, Waitara. Feed: natural gas. Product: methanol (1,450).

NICARAGUA

QUÍMICA BORDEN CASA
Tipitapa. Feed: methanol. Product: formaldehyde (6,000 mt/y).

NIGERIA

NIGERIAN NATIONAL PETROLEUM CORP.
Ekpan and Kaduna. Feed: FCC decant oil, benzene, ethylene, kerosine, refinery off gas. Products: alkylbenzene (35,000 mt/y), benzene (15,000 mt/y), carbon black (25,000 mt/y), polypropylene (35,000 mt/y).

NORWAY

I/S NORETYL
(51% Norsk Hydro, 49% Statoil)
Rafnes, Bamble. Feed: natural gas liquids. Products: ethylene (390,000 mt/y), propylene (70,000 mt/y).

NORSK HYDRO as
Porsgrunn. Feed: liquid gas, vinyl chloride. Product: polyvinyl chloride (90,000 mt/y).
Rafnes, Bamble. Feed: chlorine, ethylene. Product: vinyl chloride (420,000 mt/y).

NORSK HYDRO NORWAY
Porsgrunn, Rjukan, Glomfjord. Feed: natural gas liquids. Product: ammonia (600,000 mt/y).

NORSK KOKSVERK AS
Mo-I-Rana. Fued: coke oven gas. Products: ammonia (40,000 mt/y), benzene (5,000 mt/y), crude tar (16,000 mt/y).

PAKISTAN

DAWOOD HERCULES CHEMICALS LTD.
Chichoki Mallian. Feed: natural gas. Products: ammonia (210,000 mt/y), urea (345,000 mt/y).

EXXON CHEMICAL PAKISTAN LTD.
Daharki, Dist. Sukkur. Feed: natural gas. Products: ammonia (145,600 mt/y), urea (249,000 mt/y).

PERU

FERTILIZANTES SINTETICOS SA
Callao. Feed: Bunker 6 fuel oil. Product: ammonia (24,000 mt/y).

PETROPERU
(Licensee of Witco Corp.—Concarb Div.)
Negro de Humo plant, Talara. Feed: heavy aromatic oil. Product: carbon black (15,000 mt/y).

PETROPERU
Talara. Feed: ammonia-carbon dioxide, FCC bottoms, isopropanol, natural gas, propane-propylene. Products: acetone (5,000 mt/y), ammonia (300 mt/d), carbon black (7,700 mt/y), isopropanol (10,650 mt/y), urea (510 mt/d).

PHILIPPINES

COLUMBIAN CARBON PHILIPPINES INC.
Bataan. Feed: heavy aromatic hydrocarbons. Product: furnace carbon black (16,000 mt/y).

LMG CHEMICALS INC.
Batangas. Feed: benzene, dodecene. Product: alkylbenzene (20,000 mt/y).

PORTUGAL

COMPANHIA INDUSTRIAL DE RESINAS SINTETICAS (CIRES)
Estarreja. Feed: vinyl chloride. Product: polyvinyl chloride (70,000 mt/y).

COMPANHIA NACIONAL DE PETROQUIMICA EP
Sines. Feed: LPG, naphtha. Products: butadiene (42,000 mt/y), ethylene (300,000 mt/y), propylene (140,000 mt/y).

EPSI—Empresa de Polímeros de Sines
(85% CNP, 15% Cdf Chimie)
Sines. Feed: ethylene, propylene. Products: ld polyethylene (120,000 mt/y), hd polyethylene (60,000 mt/y), polypropylene (50,000 mt/y).

PETROGAL
Leça da Palmeira. Feed: reformate. Products: benzene (50,000 mt/y), orthoxylene (30,000 m/ty), paraxylene (90,000 mt/y), toluene (140,000 mt/y), xylene mix (10,000 mt/y).

PETROQUÍMICA E GÁS DE PORTUGAL EP
Cabo Ruivo. Feed: alcohol, naphtha, orthoxylene. Products: ammonia (150,000 mt/y), phthalic anhydride (15,000 mt/y), phthalates (20,000 mt/y).

QUIMIGAL—Química de Portugal EP
Barreiro-Lavradio. Feed: heavy fuel oil. Products: ammonia (290,000 mt/y), urea (80,000 mt/y).

PUERTO RICO

PHILLIPS PARAXYLENE INC.

Guayama. Feed: mixed xylenes. Product: paraxylene (213,000 mt/y).

PHILLIPS PUERTO RICO CORE

Guayama. Feed: naphtha. Products: cyclohexane (263,200 mt/y), orthoxylene (59,000 mt/y).

QATAR

QATAR FERTILIZER CO.
(75% Qatar General Petroleum Corp., 25% Norsk Hydro a.s.)

Umm Said. Feed: natural gas. Products: ammonia (658,328 mt/y), urea (746,892 mt/y).

QATAR PETROCHEMICAL CL.
(84% QPC, 16% CdF Chimie)

Umm Said. Feed: ethane. Products: ethylene (280,000 mt/y), ld polyethylene (170,000 mt/y), propylene (5,000 mt/y).

SAUDI ARABIA

AL-JUBAIL FERTILIZER CO.
(Sabic with Taiwan Fertilizer Co.)

Al-Jubail. Feed: methane. Product: urea (500,000 mt/y).

AL-JUBAIL PETROCHEMICAL CO.
(50% Exxon Chemical Co.)

Al-Jubail. Feed: ethylene. Product: hd polyethylene (270,000 mt/y).

ARABIAN PETROCHEMICAL CO.
(100% Sabic)

Al-Jubail. Feed: ethane, styrene. Product: ethylene (500,000 mt/y).

EASTERN PETROCHEMICAL CO.
(Sabic, Mitsubishi-led Japanese consortium)

Al-Jubail. Feed: ethane. Products: ethylene glycol (300,000 mt/y), polyethylene (130,000 mt/y).

IBN HAYYAN NATIONAL PLASTIC CO.

Al-Jubail. Feed: ethylene, ethylene dichloride. Products: polyvinyl chloride (200,000 mt/y), vinyl chloride (300,000 mt/y).

IBN-SINA NATIONAL METHANOL CO.
(25% Celanese, 25% Texas Eastern)

Al-Jubail. Feed: methane. Product: methanol (700,000 mt/y).

SAUDI ARABIAN FERTILIZER CO.
(Sabic, Safco employees, private Saudi investors)

Al-Dammam-Khobar Highway. Feed: natural gas. Products: ammonia (600 mt/d), melamine (60 mt/d), urea (1,000 mt/d).

SAUDI METHANOL CO.
(Sabic, Mitsubishi-led Japanese consortium)

Al-Jubail. Feed: methane. Product: methanol (600,000 mt/y).

SAUDI PETROCHEMICAL CO.
(50% Pecten Arabian Co.—subsidiary of Shell Oil U.S.)

Al-Jubail. Feed: ethane, benzene. Products: ethanol (281,000 mt/y), ethylene (656,000 mt/y), ethylene dichloride (454,000 mt/y), styrene (295,000 mt/y).

SAUDI YANBU PETROCHEMICAL CO.
(50% Mobil Oil Corp.)

Yanbu. Feed: ethane. Products: ethylene (455,000 mt/y), ethylene glycol (220,000 mt/y), ld polyethylene (100,000 mt/y), hd polyethylene (200,000 mt/y).

SINGAPORE

ETHYLENE GLYCOLS SINGAPORE PL
(50% Government, 30% Japanese interests, 20% Shell)

Pulau Ayer Merbau. Products: ethylene glycol, ethylene oxide.

SHELL EASTERN PETROLEUM PL
(100% Shell)

Pulau Bukom. Products: toluene, xylene mix, solvents.

SOUTH AFRICA

AECI LTD.

Midland, Sasolburg. Feed: coal based acetylene, ethylene. Products: acetylene (47,000 mt/y), ethylene dichloride (56,000 mt/y), ld polyethylene (80,000 mt/y), lld polyethylene (75,000 mt/y), polyvinyl chloride (138,000 mt/y), solvents (22,000 mt/y), vinyl chloride (143,000 mt/y).

Modderfontein. Feed: coal. Products: ammonia (1,000 mt/d), methanol (45 mt/d).

FEDMIS
(division of Sentrachem)

Milnerton. Feed: refinery gas. Product: ammonia (85,000 mt/y).

KARBOCHEM PL
(division of Sentrachem)

Newcastle. Feed: butadiene, styrene. Products: isoprene (50,000 mt/y), polybutadiene (17,500 mt/y), polyisoprene (45,000 mt/y).

Sasolburg. Product: SBR (40,000 mt/y).

NATIONAL CHEMICAL PRODUCTS LTD
(division of Sentrachem)

Germiston and Durban. Feed: benzene, molasses, naphthalene, orthoxylene, styrene. Products: acetaldehyde (12,500 mt/y), acetic acid (10,000 mt/y), ethanol (46,000 mt/y), formaldehyde (20,000 mt/y), maleic anhydride (4,500 mt/y), phthalic anhydride (35,000 mt/y), plasticizers (45,000 mt/y), solvents (25,000 mt/y).

POLY RESIN PRODUCTS
(division of Sentrachem)

Germiston. Products: alkyds (1,000 mt/y), polyamide (400 mt/y), polyester (10,000 mt/y).

SAFRIPOL PTY.
(50% Hoechst)

Sasolburg. Feed: ethylene, propylene. Products: hd polyethylene (85,000 mt/y), polypropylene (35,000 mt/y).

SASOL LTD.

Sasolburg and Secunda. Feed: coal. Products: acetone, ammonia, aromatics mix, butanol, butylenes, ethanol, ethylene, methanol, phenol, propylene, solvents.

STYROCHEM
(division of Sentrachem)

Germiston, Transvaal. Feed: styrene monomer. Product: polystyrene (14,000 mt/y).

SPAIN

AISCONDEL SA

Monzón (Huesca). Feed: acrylonitrile, butadiene, styrene, vinyl chloride monomer. Products: ABS-SAN (15,000 mt/y), polystyrene (10,000 mt/y), polyvinyl chloride (60,000 mt/y).

Vilaseca (Tarragona). Feed: ethylene, chlorine. Products: polyvinyl chloride (50,000 mt/y), vinyl chloride monomer (150,000 mt/y).

ALCUDIA

Puertollano. Feed: olefins cracker. Products: butadiene (32,000 mt/y), ld-hd polyethylene (195,000 mt/y), polyols (30,000 mt/y), polypropylene (80,000 mt/y), propylene glycol (12,000 mt/y), propylene oxide (45,000 mt/y), styrene 100,000 mt/y).

Santander. Feed: butadiene, styrene. Products: carbon black (40,000 mt/y), SBR-PB (80,000 mt/y).

Tarragona. Feed: olefins cracker. Products: acrylonitrile (85,000 mt/y), butadiene (100,000 mt/y), polyethylene (255,000 mt/y).

ATOCHEM

Prat de Llobregat. Feed: styrene. Product: ABS (8,000 mt/y), polystyrene (60,000 mt/y).

BASF ESPANOLA SA
(wholly owned by BASF)

Tarragona. Feed: acrylates, butadiene, naphtha, orthoxylene, propylene, styrene. Products: butanols (20,000 mt/y), oxoalcohols-2ethylhexanol (28,000 mt/y), phthalic anhydride (16,500 mt/y), polyamide (4,000 mt/y), polystyrene (20,000 mt/y), plasticizers (40,000 mt/y), solvents (6,600 mt/y).

BORDEN ESPANA SA

Axpe-Erandio. Feed: methanol. Products: formaldehyde (60,000 mt/y).

BRILEN SA

Barbastro. Feed: dimethyl terephthalate, ethylene glycol. Products: methanol (7,000 mt/y), polyester (22,500 mt/y).

CARBON BLACK ESPAÑOLA SA
(100% Cepsa)

San Roque. Feed: heavy aromatic oils. Product: carbon black (25,000 mt/y).

CEPSA—Compañia Española de Petroleos SA

Luchana (Vizcaya). Feed: naphtha. Products: phthalic anhydride (16,000 mt/y), plasticizers (40,000 mt/y).

San Roque. Feed: naphtha. Products: aromatics mix (20,000 mt/y), benzene (80,000 mt/y), maleic anhydride (13,000 mt/y), orthoxylene (40,000 mt/y), paraxylene (34,000 mt/y), phthalic anhydride (20,000 mt/y), propylene (60,000 mt/y), toluene (130,000 mt/y), xylene mix (120,000 mt/y), solvents (50,000 mt/y).

DOW CHEMICAL IBERICA SA

Bilbao. Products: polystyrene, SB-latex.

Tarragona. Products: benzene, ethylene, hd-ld-lld polyethylene, propylene.

EMPETROL

La Coruña. Product: propylene (40,000 mt/y).

Puertollano. Feed: naphtha, refinery gases. Products: benzene (80,000 mt/y), ethylene (210,000 mt/y), propylene (130,000 mt/y).

Tarragona. Feed: LPG, naphtha. Products: ethylene (335,000 mt/y), propylene (165,000 mt/y).

ENFERSA—Empresa Nacional de Fertilizantes SA

Avilés, Asturias. Feed: coke gases. Product: ammonia (90,000 mt/y).

Cartagena, Murcia. Feed: naphtha. Products: ammonia (240,000 mt/y), urea (145,000 mt/y).

Puertollano, Ciudad Real. Feed: naphtha. Products: ammonia (180,000 mt/y), urea (114,000 mt/y).

HISPAVIC INDUSTRIAL SA

Martorell. Feed: vcm. Product: polyvinyl chloride.

INTERQUISA—Intercontinental Quimica SA
(50% Cepsa, 50% Amoco International)

Algeciras. Feed: methanol, paraxylene. Products: dimethyl terephthalate (100,000 mt/y), terephthalic acid (80,000 mt/y).

PETROQUIMICA ESPANOLA SA
(100 % Cepsa)

San Roque (Cádiz). Feed: benzene, heavy naphtha, n-paraffins. Products: alkylbenzene (165,000 mt/y), n-paraffins (165,000 mt/y).

PRODUCTOS QUIMICOS DEL MEDITERRÁNEO SA

El Grao, Castellon de la Plana. Feed: cyclohexane. Product: caprolactam (45,000 mt/y).

RIO RODANO SA

Guturribay, Vizcaya. Feed: butadiene, styrene. Product: SBR latex (12,000 mt/y).

Hernani, Guipúzcoa. Feed: chlorine, normal paraffins, vinyl chloride monomer. Products: polyvinyl chloride (25,000 mt/y), plasticizers (3,000 mt/y).

Miranda de Ebro, Burgos. Feed: glycols, maleic anhydride, oxoalcohols, orthoxylene, vinyl chloride monomer. Products: phthalic anhydride (30,000 mt/y), polyester (22,000 mt/y), polyvinyl chloride (75,000 mt/y), plasticizers (18,000 mt/y).

TARRAGONA QUIMICA SA
(100% Hoechst)
Tarragona. Feed: olefins. Products: hd polyethylene (100,000 mt/y), polypropylene (90,000 mt/y), vinyl acetate (75,000 mt/y).

UNION EXPLOSIVOS RIO TINTO
Huelva. Feed: ammonia, benzene, naphtha. Products: cyclohexane (80,000 mt/y), ammonia (390,000 mt/y), benzene (120,000 mt/y), urea (237,000 mt/y).

VINICLOR SA
Martorell, Barcelona. Feed: ethylene. Product: vinyl chloride (240,000 mt/y).

SRI LANKA

STATE FERTILIZER MANUFACTURING CORP.
Sapugaskanda. Feed: naphtha. Products: ammonia (86,476 mt/y), urea (138,458 mt/y).

SUDAN

N-REN CORP.
Khartoum. Feed: naphtha. Product: ammonia (175 mt/d).

SWEDEN

DEGUSSA.
Malmoe. Feed: aromatic hydrocarbons, coal tar oil. Product: carbon black.

DOW CHEMICAL
Norrkoeping. Product: SB-latex.

NESTE OXO AB
Nol. Feed: orthoxylene. Product: phthalic anhydride (25,000 mt/y).
Örnsköldsvik. Feed: butyraldehyde. Product: butanol (40,000 mt/y), oxoalcohols (40,000 mt/y).
Stenungsund. Feed: propylene. Products: butyraldehyde (140,000 mt/y), oxoalcohols (90,000 mt/y).

NESTE POLYESTER AB
Nol. Product: polyester (20,000 mt/y).

NESTE POLYETEN AB
Stenungsund. Feed: ethylene. Product: ld-hd-md-lld polyethylene (440,000 mt/y).

NORSK HYDRO PLAST AB
Stenungsund. Feed: ethylene. Products: polyvinyl chloride (115,000 mt/y), vinyl chloride (110,000 mt/y).

PERSTORP AB
Perstorp. Feed: methanol. Products: formaldehyde (200,000 mt/y), melamine, phenol, urea.

STATOIL PETROKEMI AB.
Stenungsund. Feed: naphtha, propane. Products: ethylene (365,000 mt/y), propylene (200,000 mt/y).

SUPRA AB (75% Norsk Hydro)
Köping. Feed: heavy fuel oil. Products: ammonia (60,000 mt/y), urea (60,000 mt/y).

SVENSKA POLYSTYREN FABRIKEN AB
Trellerborg. Feed: styrene. Product: polystyrene (35,000 mt/y).

SWITZERLAND

ICI
Sins. Product: polyvinyl chloride (45,000 mt/y).

LONZA AG
Visp. Feed: LVN-LPG. Products: acetaldehyde, acetic acid, acetic anhydride, acetylene (15,000 mt/y), ammonia (40,000 mt/y), aniline (3,000 mt/y), ethylene (30,000 mt/y), formaldehyde.

SYRIA

GENERAL FERTILIZER CO.
Kattineh-Homs. Feed: naphtha. Products: ammonia (1,000 mt/d).

TRINIDAD

FEDERATION CHEMICALS LTD.
(subsidiary of W.R. Grace & Co.)
Point Lisas. Feed: natural gas. Products: ammonia (231,300 mt/y).

FERTILIZERS OF TRINIDAD & TOBAGO LTD.
Point Lisas. Feed: natural gas. Product: ammonia (1,044 mt/d).

TRINIDAD NITROGEN
(49% W. R. Grace & Co., and Government of Trinidad-Tobago)
Point Lisas. Feed: natural gas. Product: ammonia (370,100 mt/y).

TURKEY

BASF-SUMERBANK TURK KIMYA SANAYII AS
Gebze. Feed: methanol. Product: formaldehyde (30,000 mt/y).

PETKIM PETROKIMYA AS
Aliaga-Izmir. Feed: ammonia, NaCl, naphtha, pyrolysis gasoline. Products: acrylonitrile (70,000), benzene (124,000 mt/y), C_4 (80,000 mt/y), ethylene (300,000 mt/y), ethylene dichloride (7,000 mt/y), ethylene glycol (68,000 mt/y), ethylene oxide (54,000 mt/y), orthoxylene (37,250 mt/y), paraxylene (83,000 mt/y), phthalic anhydride (30,000 mt/y), ld polyethylene (150,000 mt/y), hd polyethylene (40,000 mt/y), polypropylene (60,000 mt/y), polyvinyl chloride (100,000 mt/y), propylene (150,750 mt/y), terephthalic acid (70,000 mt/y), vinyl chloride (105,000 mt/y).
Yarimca-Izmit. Feed: naphtha, NaCl, aromatic oil, benzene, C_4, ammonia, sulfur. Products: alkylbenzene (20,000 mt/y), butadiene (33,000 mt/y), caprolactam (25,000 mt/y), carbon black (30,000 mt/y), ethylene (55,000 mt/y), polybutadiene (13,500 mt/y), ld polyethylene (24,300 mt/y), polystyrene (13,500 mt/y), polyvinyl chloride (46,800 mt/y), propylene (39,600 mt/y), styrene (19,450 mt/y), vinyl chloride (48,600 mt/y), SBR (32,150 mt/y).

SASA
Adana. Feed: methanol, monoethylene glycol, paraxylene. Products: dimethyl terephthalate (60,000 mt/y), polyester (100,000 mt/y).

UNITED KINGDOM

ATOCHEM
Stalybridge. Product: polystyrene (60,000 mt/y).

BORDEN (U.K.) LTD.
Peterlee. Feed: methanol. Products: formaldehyde (40,000 mt/y), resins.
Southampton. Feed: methanol. Products: formaldehyde (25,000 mt/y).

BP CHEMICALS LTD.
Baglan Bay. Products: benzene concentrate (150,000 mt/y), butadiene (60,000 mt/y), ethanol (155,000 mt/y), ethylene (340,000 mt/y), isopropanol (70,000 mt/y), propylene (200,000 mt/y), styrene (220,000 mt/y), toluene (6,000 mt/y), vinyl acetate (80,000 mt/y).
Carshalton. Products: solvents and plasticizers (15,000 mt/y).
Barry. Product: resins (40,000 mt/y).

Grangemouth. Products: acetone (25,000 mt/y), acrylonitrile (80,000 mt/y), benzene (250,000 mt/y), butadiene (48,000 mt/y), ethanol (155,000 mt/y) ethylene (250,000 mt/y), polybutylenes (48,000 mt/y), hd polyethylene (130,000 mt/y), ld polyethylene (95,000 mt/y), propylene (180,000 mt/y).
Hull. Products: acetic acid (350,000 mt/y), acetone (46,000 mt/y), ethanol (25,000 mt/y), phthalic anhydride (70,000 mt/y).
Wilton. Products: butadiene (90,000 mt/y), ethylene (350,000 mt/y), ld polyethylene (70,000 mt/y), propylene (60,000 mt/y).

CIBA-GEIGY LTD.
Duxford, Cambridge. Feed: methanol. Product: formaldehyde (120,000 mt/y).

CONOCO LTD.
South Killingholme, Humberside. Feed: reformate. Product: benzene (110,000 mt/y).

DOW CHEMICAL
Barry. Product: polystyrene.

ENICHEM ELASTOMERS LTD.
Grangemouth, Scotland. Feed: butadiene, styrene, ethylene, propylene. Products: polybutadiene (45,000 mt/y) polypropylene (5,000 mt/y), SBR (30,000 mt/y), block-SBR (15,000 m/ty), ethylene-propylene rubber (15,000 mt/y).
Hythe, Hampshire. Feed: acrylonitrile, butadiene, ethylbenzene. Product: rubber (150,000 mt/y).

EXXON CHEMICAL LTD.
Fawley. Feed: petroleum fractions. Products: higher olefins (200,000 mt/y), butyl-halobutyl rubber (50,000 mt/y).

EXXON CHEMICAL OLEFINS INC.
Fawley. Feed: petroleum fractions. Products: butadiene (80,000 mt/y), ethylene (105,000 mt/y), isobutylene (60,000 mt/y), propylene (100,000 mt/y).
Mossmorran, Fife. Feed: ethane. Product: ethylene (500,000 mt/y).

IMPERIAL CHEMICAL INDUSTRIES LTD.
Barry. Product: polyvinyl chloride (90,000 mt/y).
Billingham. Products: acrylics, acetone (50,000 mt/y), nylons, oxoalcohols (250,000 mt/y), phenol (80,000 mt/y), solvents.
Caster-Kellner, Runcorn. Product: polyvinyl chloride (112,000 mt/y).
Hillhouse, Lancashire. Product: polyvinyl chloride (135,000 mt/y).
North Tees. Products: aromatics-benzene (400,000 mt/y), cumene, cyclohexane, ethylbenzene, toluene, mixed xylenes (200,000 mt/y).
Wilton. Products: butadiene, ethylene, ethylene glycols (85,000 mt/y), ethylene oxide (240,000 mt/y), nylon 66, paraxylene, polypropylene (200,000 mt/y), propylene, terephthalic acid (450,000), solvents, plasticizers, resins.

NORSK HYDRO POLYMERS LTD.
Aycliffe. Feed: vinyl chloride. Product: polyvinyl chloride (125,000 mt/y).

SEVALCO LTD.
(50% Columbian Chemicals, 50% Phillips Petroleum)
Avonmouth, Bristol. Feed: heavy aromatic oils. Product: furnace and thermal carbon black (70,000 mt/y).

SHELL CHEMICALS U.K. LTD.
Carrington. Feed: ethylene, ethylene oxide, propylene, propylene oxide, styrene. Products: ld polyethylene (105,000 mt/y), polypropylene (110,000 mt/y), polystyrene (71,000 mt/y).
Shell Haven. Feed: benzene. Product: linear alkylbenzene (90,000 mt/y).
Stanlow. Feed: refinery gases. Products: acetone, benzene (450,000 mt/y), butanol, butylenes, isopropanol (100,000 mt/y), propylene (70,000 mt/y), higher olefins (170,000 mt/y), solvents.

UKF FERTILIZERS LTD.
Ince, Chester. Feed: natural gas. Products: ammonia (950 mt/d).

UNITED STATES

AGRICO CHEMICAL CO.

(one of the Williams Companies)

Blytheville, Ark. Feed: natural gas. Products: ammonia (320,000 mt/y), urea (300,000 mt/y).

Donaldsonville, La. Feed: natural gas. Products: ammonia (385,000 mt/y), urea (180,000 mt/y).

Fort Madison, Iowa. Feed: natural gas. Product: ammonia (310,000 mt/y).

Verdigris, Okla. Feed: natural gas. Products: ammonia (770,000 mt/y), urea (370,000 mt/y)

AIR PRODUCTS AND CHEMICALS INC.

Calvert City, Ky. Feed: vinyl acetate, vinyl chloride. Products: acetic acid (54,545 mt/y), polyvinyl alcohol (52,272 mt/y), polyvinyl chloride (136,116 mt/y).

New Orleans, La. Feed: natural gas. Product: ammonia (280,000 mt/y).

Pensacola, Fla. Feed: ammonia, natural gas, vinyl chloride. Products: ammonia (94,000 mt/y), methanol (180,000 mt/y), polyvinyl chloride (90,700 mt/y), urea (28,000 mt/y).

ALLIED-SIGNAL INC.

Baton Rouge, La. Product: hd polyethylene (409,000 mt/y).

Chesterfield, Va. and Columbia, S.C. Product: nylons (280,000 mt/y).

Geismar, La. Feed: ethane, propane. Products: butadiene (16,000 mt/y), ethylene (325,000 mt/y), propylene (21,000 mt/y). (50% Allied, 50% Union Texas Petroleum).

Hopewell, Va. Product: ammonia (360,000 mt/y), caprolactam (278,000 mt/y).

Moncure, N.C. Product: polyester (54,000 mt/y).

Philadelphia. Products: acetone (175,000 mt/y), phenol (285,000 mt/y).

AMERICAN CYNAMID CO.

Fortier, La. Feed: natural gas, propylene. Products: acrylonitrile (122,470 mt/y), ammonia (610,000 mt/y), melamine (31,750 mt/y).

AMERICAN HOECHST CORP.

Pasadena, Tex. Feed: benzene, ethylene. Product: high molecular weight hd polyethylene (220 million t/y), styrene (408,000 mt/y).

Spartanburg, S.C. Feed: DMT, TPA, glycol. Product: polyester (200,000 mt/y).

AMOCO CHEMICAL CO.

Cedar Bayou, Tex. Feed: propylene. Product: polypropylene (202,000 mt/y).

Chocolate Bayou, Tex. Feed: ethane, ethylene, naphtha, propane, propylene. Products: aromatics (85,000 mt/y), butadiene (91,000 mt/y), ethylene (975,000 mt/y), hd polyethylene (171,000 mt/y), polypropylene (302,000 mt/y), propylene (390,000 mt/y).

Cooper River, S.C. Feed: paraxylene. Product: terephthalic acid (612,400 mt/y).

Decatur, Ala. Feed: paraxylene, xylene. Products: paraxylene (454,000 mt/y), terephthalic acid (711,000 mt/y).

Joliet, Ill. Feed: butane, metaxylene, styrene. Products: isophthalic acid (77,000 mt/y), maleic anhydride (35,000 mt/y), polystyrene (95,000 mt/y).

Texas City, Tex. Feed: aromatics, benzene, butylenes, crude oil, ethylene, propylene, xylene. Products: metaxylene. (102,000 mt/y), paraxylene (546,000 mt/y), polyisobutylene (99,000 mt/y), propylene (258,000 mt/y), solvents (162,000 mt/y), styrene (335,000 mt/y).

Torrance, Calif. Feed: styrene. Product: polystyrene (14,000 mt/y).

Whiting, Ind. Feed: butylenes, methanol. Product: MTBE (163,000 mt/y), polyisobutylene (75,000 mt/y).

Willow Springs, Ill. Feed: styrene. Products: polystyrene (32,000 mt/y).

AMOCO OIL CO.

Texas City, Tex. Feed: crude oil. Products: benzene (352,000 mt/y), toluene (895,000 mt/y), xylene mix (645,000 mt/y).

Whiting, Ind. Feed: crude oil. Products: propylene (110,000 mt/y), xylene mix (602,000 mt/y).

ARISTECH CHEMICAL CORP.

Bartow, Fla., Colton, Calif., Jacksonville, Ark., Linden, N.J., Neville Island, Pa. Feed: dibasic acids, alcohols, glycols, styrene. Product: polyester (122,471 mt/y).

Clairton, Pa. Feed: light oil. Products: benzene (137,417 mt/y), toluene (21,523 mt/y), xylene mix (6,622 mt/y).

Florence, Kentucky. Product: acrylics (17,237 mt/y).

Haverhill, Ohio. Feed: ammonia, cumene. Products: acetone (165,563 mt/y), bisphenol A (74,390 mt/y), phenol (265,354 mt/y).

Houston, Texas. Feed: ethane, propane, refinery gas. Products: ethylene (226,799 mt/y), propylene (74,390 mt/y), styrene (54,432 mt/y).

LaPorte, Tex., Neal, West Va. Feed: propylene. Product: polypropylene (233,602 mt/y).

Neville Island, Pa. Feed: alcohols, dibasic acids. Products: maleic anhydride (19,051 mt/y), plasticizers (95,255 mt/y).

ASHLAND CHEMICAL CO.

Catlettsburg, Ky. Feed: crude oil, coal tar light oil. Products: aromatics mix (10,900 mt/y), benzene (132,000 mt/y), cumene (190,000 mt/y), toluene (102,000 mt/y), xylene mix (76,600 mt/y).

Neal, W. Va. Feed: n-butane. Product: maleic anhydride (22,686 mt/y).

CARBON BLACK PLANTS:

Aransas Pass, Tex. 81,500 mt/y.
Belpre, Ohio 54,500 mt/y.
Ivanhoe, La. 129,000 mt/y.

ATLANTIC RICHFIELD CO.

Bayport, Tex. Feed: isobutane, propylene. Products: acetone (25,400 mt/y), propylene (107,800 mt/y), propylene glycol (507,240 mt/y).

Beaver Valley, Pa. Feed: styrene. Products: polystyrene (228,700 mt/y), styrene (101,000 mt/y).

Port Arthur, Tex. Feed: chlorine, ethylene. Products: ethylene dichloride (225,000 mt/y).

ATLAS POWDER CO.

(subsidiary of Tyler Corp.)

Joplin, Mo. Feed: natural gas. Products: ammonia (355 mt/d), urea (195 mt/d).

BASF CORP.

Chemicals Division.

Freeport, Tex. Products: acrylic-acrylates (237 mt/y), butanol-ethylhexanol (100 mt/y), caprolactam (159 mt/y).

Geismar, La. Products: ethylene glycol (177 mt/y), ethylene oxide (218 mt/y).

Lowland, Tenn. Product: nylons (227 mt/y).

South Brunswick, N.J. Product: expandable polystyrene (80 mt/y).

BISON NITROGEN PRODUCTS CO.

(65% Terra International, 35% W. R. Grace).

Woodward, Okla. Feed: ammonia, carbon dioxide. Product: urea (305 mt/d).

BORDEN CHEMICAL CO.

Chemical Division

Demopolis, Ala. Feed: methanol. Product: formaldehyde (30,657 mt/y).

Diboll, Tex. Feed: methanol. Product: formaldehyde (43,533 mt/y).

Fayetteville, N.C. Feed: methanol. Product: formaldehyde (184,000 mt/y).

Fremont, Calif. Feed: methanol. Product: formaldehyde (70,511 mt/y).

Geismar, La. Feed: methanol, natural gas. Products: acetic acid (63,500 mt/y), acetylene (46,200 mt/y), ammonia (360,000 mt/y), formaldehyde (202,000 mt/y), methanol (541,000 mt/y), urea (218,000 mt/y), vinyl acetate (340,000 mt/y), vinyl chloride (158,000 mt/y).

Illiopolis, Ill. Feed: vinyl chloride, vinyl acetate. Product: vinyl chloride (136,000 mt/y).

Kent, Wash. Feed: methanol. Product: formaldehyde (36,788 mt/y).

La Grange, Ore. Feed: methanol. Product: formaldehyde (28,817 mt/y).

Louisville, Ky. Feed: methanol. Product: formaldehyde (43,533 mt/y).

Missoula, Mont. Feed: methanol. Product: formaldehyde (45,598 mt/y).

Sheboygan, Wisc. Feed: methanol. Product: formaldehyde (70,511 mt/y).

Springfield, Ore. Feed: methanol. Product: formaldehyde (109,138 mt/y).

BORG-WARNER CHEMICALS

North American plants. Product: ABS (362,874 mt/y).

Carville, La. (with Cosden Oil & Chemical). Feed: banzene, ethylene. Products: styrene (340,195 mt/y), toluene (17,000 mt/y).

Geismar, La. (with Union Texas Petroleum and BASF). Feed: ethane, propane. Products: butadiene (2,722 mt/y), ethylene (54,431 mt/y), propylene (2,558 mt/y). Note: Borg-Warner share only.

CABOT CORP.

Pampa, Tex.; Franklin and Ville Platte, La.; and Waverly, W. Va. Feed: gas and petroleum fractions. Product: carbon blacks (furnace process and thermal) (440,000 mt/y).

CAIN CHEMICAL INC.

Bayport, Tex. Feed: ethylene. Products: ethylene glycol (220,000 mt/y), ethylene oxide (235,000 mt/y), ethylene derivatives (70,000 mt/y).

Beaumont, Tex. Feed: ethylene. Products: ethylene glycol (290,000 mt/y), ethylene oxide (210,000 mt/y).

Chocolate Bayou, Tex. Feed: gas oil, drip oil, naphtha, NGL, toluene. Products: aromatics (200,000 mt/y), butadiene (60,000 mt/y), ethylene (465,000 mt/y), propylene (270,000 mt/y).

Corpus Christi, Tex. Feed: gas oil, LPG, naphtha, toluene. Products: aromatics (225,000 mt/y), butadiene (95,000 mt/y), ethylene (635,000 mt/y), propylene (260,000 mt/y).

Matagorda, Tex. Feed: ethylene. Product: hd polyethylene (200,000 mt/y).

Orange, Tex. Feed: ethylene. Product: hd polyethylene (95,000 mt/y).

Victoria, Tex. Feed: ethylene. Product: hd polyethylene (130,000 mt/y).

CAPE INDUSTRIES

Wilmington, N.C. Feed: methanol, paraxylene. Products: dimethyl terephthalate (640,000 mt/y), terephthalic acid (140,000 mt/y).

CELANESE CHEMICAL CO.

(subsidiary of Hoechst Celanese Corp.)

Bay City, Tex. Feed: ethylene, propylene. Product: butanol (113,000 mt/y), butaraldehyde (113,000 mt/y), vinyl acetate (216,000 mt/y).

Bishop, Tex. Feed: natural gas. Products: formaldehyde (818,000 mt/y), methanol (393,000 mt/y).

Clear Lake, Tex. Feed: natural gas, ethylene. Products: acetic acid (409,000 mt/y), acrylic acid-esters (136,000 mt/y), ethylene glycol (227,000), ethylene oxide (205,000 mt/y), vinyl acetate (200,000 mt/y).

Newark, N.J. Feed: methanol. Product: formaldehyde (55,000 mt/y).

Pampa, Tex. Feed: butane. Product: acetic acid (250,000 mt/y), acetic anhydride.

Rock Hill, S.C. Feed: methanol. Product: formaldehyde (55,000 mt/y).

CERTAINTEED CORP.

Lake Charles, La. Feed: vinyl chloride monomer. Product: polyvinyl chloride (105,000 mt/y).

CF INDUSTRIES INC.

Donaldsonville, La. Feed: natural gas. Products: ammonia (1,500,000 mt/y), urea (900,000 mt/y).

Terre Haute, Ind. Feed: natural gas. Product: ammonia (130,000 mt/y).

CHAMPLIN PETROLEUM CO.

Corpus Christi, Tex. Feed: crude oil. Products: benzene (62,000 mt/y), cumene (200,000 mt/y), cyclohexane (73,000 mt/y), toluene (110,000 mt/y), xylene mix (15,000 mt/y).

CHEMBOND CORP.
(subsidiary of Texaco Oil Co.)

Andalusia, Ala. Feed: methanol. Product: formaldehyde (45,000 mt/y).

Moncure, N.C. Feed: methanol. Product: formaldehyde (55,000 mt/y).

Springfield, Ore. Feed: methanol. Product: formaldehyde (73,000 mt/y).

Winnfield, La. Feed: methanol. Product: formaldehyde (45,000 mt/y).

CHEVRON CHEMICAL CO.
(subsidiary of Standard Oil Co. of California)

Baytown, Tex. Feed: distillate, LPG, ethylene, naphtha. Products: alphaolefins (113,600 mt/y), ethylene (730,000 mt/y), butadiene (190,000 mt/y), ld polyethylene (272,000 mt/y), propylene (355,700 mt/y).

Marietta, Ohio. Feed: styrene. Product: polystyrene (200,000 mt/y).

Orange, Tex. Feed: ethylene. Product: ld polyethylene (397,000 mt/y), hd polyethylene (261,700 mt/y).

Pascagoula, Miss. Feed: petroleum base stocks. Product: paraxylene (227,000 mt/y).

Philadelphia, Pa. Feed: petroleum base stocks. Products: benzene (127,000 mt/y), cumene (204,000 mt/y), toluene (102,000 mt/y).

Port Arthur, Tex. Feed: petroleum base stocks. Products: benzene (360,000 mt/y), butadiene (22,000 mt/y), cumene (204,000 mt/y), cyclohexane (112,000 mt/y), ethylene (432,000 mt/y), propylene (175,000 mt/y), toluene (132,000 mt/y).

St. Helens, Ore. Feed: natural gas. Products: ammonia (73,000 mt/y), urea (90,000 mt/y).

St. James, La. Feed: benzene, ethylene. Product: styrene (272,000 mt/y), toluene (23,000 mt/y).

CITGO PETROLEUM CORP.

Lake Charles, La. Feed: crude. Products: propylene (307 mt/d).

COASTAL EAGLE POINT OIL CO.

Westville, N.J. Feed: crude oil. Product: cumene (94,000 mt/y).

COLUMBIA NITROGEN CORP.
(NV DSM subsidiary).

Augusta, Ga. Feed: natural gas. Products: ammonia (500,000 mt/y), urea (360,000 mt/y).

COLUMBIAN CHEMICALS CO.

El Dorado, Ark., Franklin, La., Mojave, Calif., Moundsville, W. Va., Ulysses, Kans. Feed: heavy aromatic hydrocarbons. Product: carbon black (293,000 mt/y).

COMINCO AMERICAN INC.

Borger, Tex. Feed: natural gas. Products: ammonia (325,000 mt/y), urea (70,000 mt/y).

CONCARB DIVISION, WITCO CORP.

Phenix City, Ala. Feed: heavy aromatic oil. Product: carbon black (25,000 mt/y).

Ponca City, Okla. Feed: heavy aromatic oil. Product: carbon black (61,500 mt/y).

Sunray, Tex. Feed: heavy aromatic oil. Product: carbon black (45,500 mt/y).

COPOLYMER RUBBER & CHEMICAL CORP.

Addis, La. Feed: petroleum derivative. Product: ethylene-propylene rubber (40,000 mt/y).

Baton Rouge, La. Feed: petroleum derivatives. Products: styrene-butadiene rubber (190,000 mt/y).

CROWN CENTRAL PETROLEUM CORP.

Pasadena, Tex. Feed: crude oil. Products: benzene (70,000 mt/y), propylene (33,000 mt/y), toluene (35,000 mt/y), xylene (35,000 mt/y).

DIAMOND SHAMROCK REFINING & MARKETING CO.

Sunray, Tex. Feed: natural gas. Product: ammonia (400 mt/d).

DIVERSITECH GENERAL
(A GenCorp Co.)

Mogadore, Ohio. Feed: butadiene, styrene, vinyl pyridine. Product: SB-latices (63,500 mt/y).

DIXIE CHEMICAL CO.

Bayport, Tex. Product: acrylics (4,500 mt/y).

DOW CHEMICAL

Freeport, Tex. Products: acetylene (4,000 mt/y), acrylonitrile-butadiene-styrene (136,000 mt/y), ammonia (47,000 mt/y), benzene (23,000 mt/y), bisphenol A (77,000 mt/y), butadiene (39,000 mt/y), ethylbenzene (795,000 mt/y), ethylene (1,136,000 mt/y), ethyl chloride (35,000 mt/y), ethylene dichloride (727,000 mt/y), ethylene glycol (115,000 mt/y), ethylene oxide (130,000 mt/y), phenol (211,000 mt/y), hd polyethylene (75,000 mt/y), ld polyethylene (400,000 mt/y), propylene (250,000 mt/y), propylene glycol (114,000 mt/y), propylene oxide (435,000 mt/y), styrene (681,000 mt/y).

Ironton, Ohio. Products: acrylonitrile (29,000 mt/y), polystyrene.

Oyster Creek (Freeport), Tex. Products: acetone (127,000 mt/y), ethylene dichloride (500,000 mt/y), vinyl chloride (350,000 mt/y).

Plaquemine, La. Products: ethylene (682,000 mt/y), ethylene dichloride (900,000 mt/y), ethylene glycol (204,000 mt/y), ethylene oxide (206,000 mt/y), hd polyethylene (120,000 mt/y), ld polyethylene (350,000 mt/y), propylene (75,000 mt/y), propylene glycol (68,000 mt/y), propylene oxide (200,000 mt/y), plasticizers (54,000 mt/y).

Torrance, Calif. Products: acrylonitrile (34,000 mt/y), polystyrene (453,000 mt/y).

EASTMAN CHEMICAL PRODUCTS INC.

Longview, Tex. Feed: propane, ethane. Products: acetaldehyde (215,000 mt/y), ethanol, ethylene, ethylene oxide, oxoalcohols, polyethylene (280,000 mt/y), polypropylene (65,000 mt/y), propylene, solvents.

EL PASO PRODUCTS CO.

Bayport, Tex. Feed: propylene. Product: polypropylene (121,000 mt/y).

Odessa, Tex. Feed: benzene, ethane, propane. Products: butadiene (14,900 mt/y), ethylene (227,000 mt/y), ld polyethylene (186,400 mt/y), polypropylene (60,000 mt/y), propylene (60,000 mt/y), styrene (130,000 mt/y).

ETHYL CORP.

Orangeburg, S.C. Feed: ethylene. Product: alkylbenzene.

Pasadena, Tex. Feed: ethylene. Product: alphaolefins, ethylchloride, ethylene dichloride.

EXXON CHEMICAL AMERICAS

Baton Rouge, La. Feed: petroleum intermediates. Products: benzene, butadiene, butylenes, carbon black feedstocks, ethylene, ethylene vinyl acetate copolymers, heart cut distillates, higher olefins, isoparaffins, isoprene, isopropanol, oxoalcohols, phthalic anhydride, ld polyethylene, propylene, vinyl acetate, plasticizers, resins, butyl rubber, chlorobutyl, ep rubber, solvents.

Baytown, Tex. Feed: petroleum intermediates. Products: benzene, butadiene, butene 1, ethylene, isoamylene, isobutylene, MTBE, orthoxylene, paraffins, paraxylene, polybutene polymers, polypropylene, polyisobutylene, propylene, butyl rubber.

Bayway, N.J. Feed: petroleum intermediates. Products: polyisobutylene, propylene, solvents.

Mont Belvieu, Tex. Products: linear ld polyethylene, hd polyethylene.

FARMLAND INDUSTRIES INC.

Dodge City, Kan. Feed: natural gas. Product: ammonia (590 mt/d).

Enid, Okla. Feed: natural gas. Product: ammonia (2,280 mt/d), urea (900 mt/d).

Fort Dodge, Iowa. Feed: natural gas. Product: ammonia (570 mt/d).

Hastings, Neb, Feed: natural gas. Product: ammonia (410 mt/d).

Lawrence, Kan. Feed: natural gas. Products: ammonia (1,040 mt/d), urea (680 mt/d).

Pollock, La. Feed: natural gas. Product: ammonia (1,140 mt/d).

FINA OIL & CHEMICAL CO.

Big Spring, Tex. Feed: crude oil. Product: propylene (34,400 mt/y).

Calumet City, Ill. Feed: styrene. Product: polystyrene (83,800 mt/y).

Carville, La. Feed: benzene, ethylene. Products: polystyrene (68,000 mt/y), styrene (340,300 mt/y).

Groves, Tex. Feed: LPG. Product: propylene (55,000 mt/y).

LaPorte, Tex. Feed: ethylene, propylene. Product: polypropylene (226,800 mt/y).

Port Arthur, Tex. Feed: crude oil. Products: benzene (171,000 mt/y), xylene mix (295,000 mt/y).

Windsor, N.J. Feed: styrene. Product: polystyrene (61,250 mt/y).

FIRESTONE SYNTHETIC RUBBER & LATEX CO.

Lake Charles, La. Feed: butadiene, styrene. Product: SBR (120,000 mt/y).

Orange, Tex. Feed: butadiene. Products: polybutadiene (110,000 mt/y).

GENERAL TIRE INC.
(A GenCorp Co.)

Odessa, Tex. Feed: butadiene, styrene. Product: SBR (99,793 mt/y).

GEORGIA GULF CORP.

Bound Brook, N.J. Feed: cumene. Products: acetone (43,000 mt/y), phenol (71,200 mt/y).

Delaware City, Del. Feed: vinyl chloride. Products: polyvinyl chloride (68,200 mt/y).

Houston, Tex. Feed: benzene, propylene. Product: cumene (400,000 mt/y).

Plaquemine, La. Feed: chlorine, cumene, ethylene, hydrogen, natural gas, vcm. Products: acetone (90,400 mt/y), ammonia (161,500 mt/y), methanol (379,000 mt/y), phenol (149,700 mt/y), polyvinyl chloride (317,600 mt/y), vinyl chloride (454,500 mt/y).

GEORGIA-PACIFIC CORP.

Albany, Oregon. Feed: methanol. Product: formaldehyde (54,446 mt/y).

Bellingham, Wash. Feed: pulp mill liquor. Product: ethanol (18,000 mt/y).

Columbus, Ohio. Feed: methanol. Product: formaldehyde (77,133 mt/y).

Conway, N.C. Feed: methanol. Product: formaldehyde (47,641 mt/y).

Crossett, Ark. Feed: methanol. Product: formaldehyde (72,596 mt/y).

Lufkin, Tex. Feed: methanol. Product: formaldehyde (45,372 mt/y).

Russellville, S.C. Feed: methanol. Product: formaldehyde (99,819 mt/y).

Taylorsville, Miss. Feed: methanol. Product: formaldehyde (54,446 mt/y).

Vienna, Ga. Feed: methanol. Product: formaldehyde (45,372 mt/y).

BFGOODRICH CO. GEON VINYL DIVISION

Avon Lake, Ohio, Calvert City and Louisville, Ky., Deer Park and LaPorte, Tex., Long Beach, Calif., Pedricktown, N.J., Plaquemine, La., Terre Haute, Ind. Products: vinyl chloride monomer and vinyl resins.

GOODYEAR TIRE & RUBBER CO.

Beaumont, Tex. Feed: C-5 streams, butadiene. Products: isoprene (81,600 mt/y), polyisoprene (60,000 mt/y), polybutadiene (182,000 mt/y).

Calhoun, Ga. Feed: butadiene, styrene. Product: SBR (41,000 mt/y).

Houston, Tex. Feed: acrylonitrile, butadiene-styrene. Products: acrylonitrile-butadiene rubber (14,000 mt/y), styrene-butadiene rubber (310,000 mt/y).

Niagara Falls, N.Y. Feed: vinyl chloride monomer. Product: polyvinyl chloride (54,000 mt/y).

Point Pleasant, W. Va. Feed: tpa, ethylene glycol. Product: polyester (154,000 mt/y).

W.R. GRACE & CO.

Memphis, Tenn. Feed: natural gas. Products: ammonia (308,400 mt/y), urea (349,300 mt/y).

GREEN VALLEY CHEMICAL CORP.
Creston, Iowa. Feed: natural gas. Product: ammonia (100 mt/d).

HAWKEYE CHEMICAL CO.
Clinton, Iowa. Feed: natural gas and hydrogen. Products: ammonia (200,000 mt/y), urea (60,000 mt/y).

HERCOFINA
(joint venture Hercules Inc. and American Petrofina)
Wilmington, N.C. Feed: paraxylene, methanol, Products: dimethyl terephthalate (640,000 mt/y), terephthalic acid (140,000 mt/y).

HERCULES INC.
Louisiana, Mo. Feed: natural gas. Product: formaldehyde (80,000 mt/y).

HILL PETROLEUM CO.
Houston, Tex. Feed: crude and intermediate petroleum feedstocks. Products: benzene (22,127 mt/y), normal paraffins (61,250 mt/y), toluene (51,058 mt/y), xylene mix (48,059 mt/y).

HIMONT USA INC.
Bayport, Tex. Feed: propylene. Product: polypropylene (225,000 mt/y).
Lake Charles, La. Feed: propylene. Product: polypropylene (360,000 mt/y).

J.M. HUBER CORP.
Baytown, Tex. Feed: refinery bottoms. Product: carbon black (318 mt/d).
Borger, Tex. Feed: refinery bottoms. Product: carbon black (235 mt/d).
Orange, Tex. Feed: refinery bottoms. Product: carbon black (167 mt/d).

INTERNATIONAL MINERALS & CHEMICAL CORP.
Sterlington, La. Feed: natural gas. Product: ammonia (840,000 mt/y).

KOPPERS CI
Bridgeville, Pa. Product: polyester.
Chicago, Ill. Feed: naphthalene, orthoxylene. Products: phthalic anhydride (57,000 mt/y), polyester.
Follansbee, W. Va. Feed: coal tar. Product: naphthalene (70,000 mt/y).
Oxnard, Calif. Product: polyester.
Richmond, Calif. Product: polyester.

LaROCHE INDUSTRIES INC.
Cherokee, Alabama. Feed: natural gas. Product: ammonia (175,000 mt/y).

LYONDELL PETROCHEMICAL CO.
(wholly owned by Atlantic Richfield Co.)
Channelview, Tex. Feed: ethane, gas oils, naphthas, mixed C_4's, natural gas, propane. Products: butadiene (200,000 mt/y), butylenes (170,000 mt/y), ethylbenzene (612,250 mt/y), ethylene (1,270,000 mt/y), isoprene (45,000 mt/y), isopropanol (25,900 mt/y), methanol (600,000 mt/y), polybutadiene (8,150 mt/y), propylene (725,000 mt/y), propylene oxide (235,500 mt/y), styrene (542,200 mt/y).
Houston, Tex. Feed: refinery feeds. Products: benzene (170,000 mt/y), orthoxylene (110,000 mt/y), paraxylene (175,000), toluene (100,000 mt/y).

MARATHON OIL CO.
Detroit, Mich. Feed: refinery. Product: propylene (58,000 mt/y).
Robinson, Ill. Feed: refinery gas. Product: propylene (50,000 mt/y).
Texas City, Tex. Feed: refinery. Products: benzene (20,000 mt/y), propylene (60,800 mt/y), toluene (75,000 mt/y), xylene mix (48,400 mt/y).

MELAMINE CHEMICALS INC.
Donaldsonville, la. Feed: urea. Product: melamine (32,000 mt/y).

MISSISSIPPI CHEMICAL CORP.
Yazoo City, Miss. Feed: natural gas. Product: ammonia (1,070 mt/d), urea (475 mt/d).

MOBIL CHEMICAL CO.
(division of Mobil Oil Corp.)
Beaumont, Tex. Feed: natural gas liquids, reformate. Products: benzene (167,000 mt/y), butadiene (27,000 mt/y), butylenes (13,000 mt/y), ethylene (476,000 mt/y), ld polyethylene (450,000 mt/y), propylene (110,000 mt/y), toluene (295,000 mt/y).
Holyoke, Mass. Feed: styrene. Products: polystyrene (34,000 mt/y).
Joliet, Ill. Feed: styrene. Product: polystyrene (136,000 mt/y).
Santa Ana, Calif. Feed: styrene. Product: polystyrene (30,000 mt/y).

MONSANTO
Addyston, Ohio; Decatur, Ala; Springfield, Mass. Product: polystyrene (317,518 mt/y).
Addyston, Ohio; Muscatine, Iowa. Product: ABS (228,000 mt/y).
Alvin, Tex. Feed: propylene. Product: acrylonitrile (210,000 mt/y).
Luling, La. Feed: natural gas. Product: ammonia (210,000 mt/y).
Pensacola, Fla. Feed: butane. Product: maleic anhydride (58,968 mt/y).
St. Louis, Mo. Feed: butane. Product: maleic anhydride (18,144 mt/y).

NIPRO INC.
(NV DSM subsidiary)
Augusta, Ga. Feed: cyclohexane. Product: caprolactam (140,000 mt/y).

N-REN CORP.
Carlsbad, N.M. Feed: natural gas. Product: ammonia (70,000 mt/y).
East Dubuque, Ill. Feed: natural gas. Products: ammonia (250,000 mt/y).
Pine Bend, Minn. Feed: natural gas. Product: ammonia (27,000 mt/y).
Pryor, Okla. Feed: natural gas. Products: ammonia (75,000 mt/y).

NUODEX INC.
Chestertown, Md. Feed: alcohols, phthalic anhydride. Product: plasticizers (36,000 mt/y).

OCCIDENTAL CHEMICAL CO.
Addis, La. Feed: vinyl chloride. Product: polyvinyl chloride (133,000 mt/y).
Burlington, N.Y. Feed: vinyl chloride. Product: polyvinyl chloride (68,000 mt/y).
Pottstown, Pa. Feed: vinyl chloride. Product: polyvinyl chloride (94,000 mt/y).

OKLAHOMA NITROGEN CO.
(62.5% W.R. Grace, 37.5% Terra International)
Woodward, Okla. Feed: natural gas. Product: ammonia (408,200 mt/y).

OLIN CORP.
Lake Charles, La. Feed: natural gas. Products: ammonia (480,000 mt/y), urea (214,000 mt/y).

PHILLIPS 66 CO.
Pasadena, Tex. Feed: butadiene, ethylene, propylene, styrene. Products: hd polyethylene (600,000 mt/y), polypropylene (113,000 mt/y), resins (68,000 mt/y).
Sweeny, Tex. Feed: benzene, crude oil, natural gas liquids. Products: aromatics mix (275,000 mt/y), cyclohexane (262,000 mt/y), ethylene (1,143,000 mt/y), propylene (255,000 mt/y).

POLYSAR INC.
Chattanooga, Tenn. Feed: butadiene, styrene. Product: SBR, latex (70,000 mt/y).
Copley, Ohio. Feed: styrene. Product: polystyrene (63,000 mt/y).
Decatur, Ala. Feed: styrene. Product: polystyrene.
Leominster, Mass. Feed: styrene. Product: polystyrene (82,000 mt/y).
Monaca, Pa. Feed: butadiene, styrene. Product: SBR, latex (22,000 mt/y).

Orange, Tex. Feed: butadiene, ethylene, propylene. Product: butadiene rubber (88,000 mt/y).
Springfield, Mass. Feed: styrene. Product: polystyrene.

PPG INDUSTRIES INC.
Lake Charles, La. Feed: ethylene. Products: ethylchloride (68,000 mt/y), ethylene dichloride (320,000 mt/y), vinyl chloride (227,000 mt/y).

REICHHOLD CHEMICAL INC.
Hampton, S.C. Feed: methanol. Product: formaldehyde.
Houston, Tex. Feed: methanol. Product: formaldehyde.
Kansas City, Kans. Product: formaldehyde.
Tacoma, Wash. Product: formaldehyde.

ROHM AND HAAS CO.
Bayport, Tex; Bristol and Croydon, Pa; Calumet City, Ill; Fayetteville, N.C.; Hayward, Calif; Louisville, Ky. Products: acrylics, acrylic esters, plasticizers, polyester, polyethylene, specialty acrylic monomers and polymers.
Deer Park, Texas. Feed: natural gas, propylene. Products: acrylic acid and esters (280,000 mt/y).

RUBICON INC.
Geismar, La. Feed: benzene. Product: aniline (136,000 mt/y).

SHELL CHEMICAL CO.
Deer Park, Tex. Feed: natural gas liquids, petroleum fractions. Products: acetone (196,000 mt/y), benzene (500,000 mt/y), bisphenol A (158,000 mt/y), butadiene (113,000 mt/y), ethylene (812,000 mt/y), isoprene concentrate (49,000 mt/y), isopropanol (225,000 mt/y), normal paraffins (99,000 mt/y), phenol (247,000 mt/y), propylene (485,000 mt/y), resins (90,000 mt/y), toluene (167,000 mt/y), vinyl chloride (381,000 mt/y), xylene mix (181,000 mt/y).
Geismar, La. Feed: ethylene. Products: linear C_4 + olefins (295,000 mt/y), ethylene glycol (226,000 mt/y), ethylene oxide (362,000 mt/y), glycol ethers (29,000 mt/y).
Marietta, Ohio. Product: thermoplastic rubber (170,000 mt/y).
Norco, La. Feed: natural gas liquids, petroleum fractions. Products: butadiene (226,000 mt/y), ethylene (1,016,000 mt/y), polypropylene (136,000 mt/y), propylene (635,000 mt/y).
Odessa, Tex. Product: benzene (15,000 mt/y).
Taft, La. Product: polybutylene (27,000 mt/y).
Woodbury, N.J. Product: polypropylene (147,000 mt/y).
Wood River, Ill. Product: benzene (149,000 mt/y).

SHELL CHEMICAL CO. and UNION CARBIDE CORP.
(Joint ownership)
Seadrift, Tex. Product: polypropylene (90,000 mt/y).

SHINTECH INC.
Freeport, Tex. Feed: vinyl chloride monomer. Product: polyvinyl chloride (460,000 mt/y).

SID RICHARDSON CARBON CO.
Addis, La. Feed: heavy oil and natural gas. Product: carbon black (61,000 mt/y).
Big Spring, Tex. Feed: heavy oil. Product: carbon black (53,000 mt/y).
Borger, Tex. Feed: heavy oil. Product: carbon black (97,000 mt/y).

SIMPLOT & CO., J.R.
Pocatello, Idaho. Feed: natural gas. Product: ammonia (275 mt/d)

SOHIO Oil Co.
Alliance, La. Feed: reformate, toluene. Products: benzene (217,000 mt/y), xylene mix (200,000 mt/y).
Lima, Ohio. Feed: refinery gases, reformate, toluene. Products: benzene (333,150 mt/y), propylene (157,200 mt/y).

SOLTEX POLYMER CORP.
(subsidiary of Solvay & Cie.)

Deer Park, Tex. Feed: ethylene, propylene. Product: hd polyethylene, polypropylene.

STANDARD OIL CHEMICAL CO.

Green Lake, Tex. Feed: ammonia, propylene. Product: acrylonitrile (270,000 mt/y).

Lima, Ohio. Feed: ammonia, natural gas, propylene. Products: acrylonitrile (160,000 mt/y), ammonia (1,360 mt/d), urea (1,300 mt/d).

STEPAN CHEMICAL CO.

Joliet, Ill. Feed: orthoxylene. Product: phthalic anhydride (77,000 mt/y).

SUN CO.

Marcus Hook, Pa. Feed: crude, purchased gas oil and naphtha. Products: benzene (84,000 mt/y), propylene (184,000 mt/y), toluene (160,000 mt/y), xylene mix (120,000 mt/y).

Toledo, Ohio. Feed: crude. Products: benzene (84,000 mt/y), toluene (214,000 mt/y), xylene mix (148,000 mt/y).

Tulsa, Okla. Feed: crude. Products: benzene (5,000 mt/y), cyclohexane (108,000 mt/y), toluene (10,000 mt/y).

SUNOLIN CHEMICAL CO.

Claymont, Del. Feed: refinery dry gas, oxygen. Products: ethylene (108,863 mt/y), ethylene oxide (45,352 mt/y).

TENNECO OIL CO.

Chalmette, La. Feed: reformate. Products: benzene (61,500 mt/y),orthoxylene (61,500 mt/y), paraxylene (67,700 mt/y), toluene (126,200 mt/y), xylene mix (13,900 mt/y).

TENNESSEE VALLEY AUTHORITY

Muscle Shoals, Ala. Feed: natural gas. Products: ammonia (248 mt/d).

TENN-USS CHEMICALS CO.
(Joint ownership Tenneco and USX)

Pasadena, Tex. Feed: 2 ethyl hexanol, orthoxylene, phthalic anhydride, propylene. Product: normal paraffins (86,365 mt/y), phthalic anhydride (95,255 mt/y).

TERRA INTERNATIONAL INC.

Sioux City (Port Neal), Iowa. Feed: natural gas. Products: ammonia (650 mt/d), urea (635 mt/d).

TEXACO CHEMICAL CO.

Delaware City, Del. Feed: petroleum fractions. Products: benzene (73,000 mt/y), naphthalene (35,000 mt/y), toluene (55,000 mt/y).

El Dorado, Kans. Feed: petroleum fractions. Products: acetone (25,000 mt/y), cumene (61,000 mt/y), phenol (43,000 mt/y), toluene (33,000 mt/y).

Port Arthur, Tex. Feed: naphtha fractions. Products: aromatics (250,000 mt/y), benzene (165,000 mt/y), butadiene (51,000 mt/y), cyclohexane (200,000 mt/y), ethylene (475,000 mt/y), propylene (238,000 mt/y).

TEXAS CITY REFINING INC.

Texas City, Tex. Feed: refinery streams. Products: propylene (73,000 mt/y).

TEXAS EASTMAN CO.

Harrison County, Tex. Feed: ethane, naphtha, propane. Products: acetaldehyde (215,000 mt/y), aromatics mix (80,000 mt/y), butanol (80,000 mt/y), butylenes-butadiene mix (50,000 mt/y), butyraldehyde (335,000 mt/y), ethanol (80,000 mt/y), ethylene (590,000 mt/y), ethylene glycol (85,000 mt/y), ethylene oxide (90,000 mt/y), oxoalcohols (225,000 mt/y), ld polyethylene (285,000 mt/y), polypropylene (70,000 mt/y), propylene (270,000 mt/y), solvents (200,000 mt/y).

TEXAS PETROCHEMICALS CORP.
(subsidiary of Texas Olefins Co.)

Houston, Tex. Feed: mixed C_4 olefins, diolefins, isobutane, methanol. Products: butadiene (350,000 mt/y), butene 1 (90,000 mt/y), diisobutylene (30,000 mt/y), isobutylene (25,000 mt/y), MTBE (470,000 mt/y).

TRIAD CHEMICAL CO.
(joint venture Mississippi Chemical and First Mississippi Corp.)

Donaldsonville, La. Feed: natural gas. Products: ammonia (1,100 mt/y), urea (1,350 mt/y).

UNION CARBIDE CORP.

Bound Brook, N.J. Feed: cumene, petroleum derived feedstocks, derivatives. Products: acetone (50,000 mt/y), formaldehyde (45,000 mt/y), phenol (80,000 mt/y), polystyrene.

Seadrift, Tex. Feed: ethane, propane. Products: acetylene (9,000 mt/y), butadiene, ethylbenzene (170,000 mt/y), ethylene (562,300 mt/y), ethylene glycol, ethylene oxide, oxoalcohols, ld polyethlene (362,874 mt/y), ld polyethylene (225,000 mt/y), lld polyethylene (308,000 mt/y), propylene, styrene (136,000 mt/y), solvents.

Taft, La. Feed: ethane, propane, butane, paraffinate, naphtha. Products: acetic acid, acetylene (5,000 mt/y), acrylic acid and acrylic esters (90,000 mt/y), benzene (230 mt/y), butadiene, ethylene (498,900 mt/y), ethylene dichloride (70,000 mt/y), ethylene glycol, ethylene oxide, lld-hdpolyethylene (327,273 mt/y), propylene.

Texas City, Tex. and Ponce, Puerto Rico. Feed: butadiene, ethylene, propylene. Products: acetylene (63,000 mt/y), butanol (168,000 mt/y), butyraldehyde (195,000 mt/y), ethanol (339,000 mt/y), ethylene—Ponce (412,700 mt/y), ethylene—Texas City (702,300 mt/y), isopropanol (349,000 mt/y).

UNOCAL CHEMICALS DIVISION

Beaumont, Tex. Feed: reformate. Products: benzene (51,100 mt/y), cyclohexane (50,000 mt/y), toluene (95,800 mt/y), xylene mix (105,900 mt/y).

Brea, Calif. Feed: natural gas. Products: ammonia (227,000 mt/y), urea (109,000 mt/y).

Bridgeview and Lemont, Ill. Product: polymers (62,900 mt/y).

Charlotte, N.C. Product: polymers (133,000 mt/y).

Kenai, Alaska. Feed: natural gas. Products: ammonia (1,034,000 mt/y), urea (907,000 mt/y).

La Mirada and Newark, Calif. Products: polymers (73,200 mt/y).

Lemont, Ill. Feed: reformate, primary light oil. Products: benzene (92,000 mt/y), toluene (50,400 mt/y), xylene mix (35,300 mt/y).

UNIROYAL CHEMICAL CO.

Geismar, La. Feed: ethylene, propylene. Product: ethylene-propylene rubber (44,000 mt/y).

USI CHEMICALS CO.

Clinton, Iowa. Feed: ethane-propane mix. Products: butadiene (17,000 mt/y), ethylene (365,000 mt/y), ld polyethylene (195,500 mt/y), hd polyethylene (159,000 mt/y), propylene (14,000 mt/y).

Deer Park, Texas. Feed: carbon monoxide, ethylene, methanol. Products: acetic acid (272,200 mt/y), ld polyethylene (207,000 mt/y), hd polyethylene (250,000 mt/y), vinyl acetate (272,200 mt/y).

Houston, Texas. Feed: ethylene. Product: polyvinyl alcohol (10,000 mt/y).

Morris, Ill. Feed: butane, ethane, propane. Products: butadiene (110,000 mt/y), ethylene (430,000 mt/y), ethylene glycol (96,500 mt/y), ethylene oxide (41,000 mt/y), ld polyethylene (254,500 mt/y), lld polyethylene (113,600 mt/y), polypropylene (109,000 mt/y), propylene (110,000 mt/y).

Port Arthur, Texas. Feed: ethylene Products: ld polyethylene (86,000 mt/y), hd polyethylene (154,500 mt/y).

Tuscola, Illinois. Feed: ethylene. Products: ethanol (198,000 mt/y), ethylene (182,000 mt/y), ld polyethylene (77,000 mt/y).

VISTA CHEMICAL CO.

Aberdeen, Miss. and Oklahoma City, Okla. Feed: vinyl chloride monomer. Product: polyvinyl chloride (324,000 mt/v).

**VOLCAN? **

Baltimore, Md. Feed: benzene, n-paraffins. Products: alkylbenzene (102,000 mt/y).

West Lake, La. Feed: benzene, ethane, kerosine. Products: alkylbenzene (68,000 mt/y), aromatics (7,600 mt/y), butadiene (14,500 mt/y), ethylene (295,000 mt/y), n-paraffins (150,000 mt/y), propylene (7,720 mt/y), vinyl chloride (317,000 mt/y).

VULCAN MATERIALS CO.

Geismar, La. Feed: ethylene. Product: ethylene dichloride (100,000 mt/y).

URUGUAY

ITALCOLOR SA

San José. Feed: methanol. Products; formaldehyde (7,200 mt/y).

VENEZUELA

ESTIZULIA—Estireno del Zulia
(37.5% Pequiven, 37.5% Grupo Zuliano CA, 25% Dow Chemical)

Zuliz-El Tablazo Complex. Feed: styrene. Products: polystyrene (40,000 mt/y).

INTEQUIM—Quimica Integrada

Valencia. Products: acrylics (7,800 mt/y), alkyds (8,000 mt/y), formaldehyde (7,400 mt/y), polyester (5,600 mt/y).

NEGROVEN

Valencia. Feed: aromatic oil. Product: carbon black (40,000 mt/y).

NITROVEN—Venezolana del Nitrogeno
(Pequiven, Instituto Fomento Industrial, International Development & Investment CL)

Zulia-El Tablazo Complex. Feed: natural gas. Products: ammonia (594,000 mt/y-two units), urea (792,000 mt/y-two units).

OXIDOR—Oxidaciones Orgánicas
(59.44% Corimon, 29.13% Corpoquim, 11.3% Pequiven)

Valencia, Edo. Carabobo. Feed: orthoxylene. Product: phthalic anhydride (18,000 mt/y).

PEQUIVEN—Petroquimica de Venezuela.

Zulia-El Tablazo Complex. Feed: ethane, natural gas, propane. Products: ethylene (150,000 mt/y), propylene (32,000 mt/y).

Morón, Edo Carabobo. Feed: natural gas. Products: ammonia (198,000 mt/y), urea (247,500 mt/y).

PETROPLAS—Plásticos Petroquímica
(100% Pequiven)

El Tablazo. Feed: chlorine, ethylene. Products: ethylene dichloride (79,000 mt/y), polyvinyl chloride (40,000 mt/y), vinyl chloride (48,000 mt/y).

PLASTILAGO—Plásticos del Lago
(49% Pequiven, 31.45% Grupo Zuliano CA, 15% CdF Chimie, 4.55% Mitsui Petrochemical)

El Tablazo. Feed: ethylene. Product: hd polyethylene (60,000 mt/y).

POLILAGO—Polimeros del Lago.
(40% Pequiven, 30% Grupo Zuliano CA, 30% Cdf Chimie)

Zulia-El Tablazo Complex. Feed: ethylene. Product: ld polyethylene (60,000 mt/y).

QUÍMICA VENOCO
(64.72% Industrias Venoco, 17.64% Pequiven, 17.64% Química de Venezuela)

Guacara, Edo. Carabobo. Feed: benzene, propylene. Products: alkylbenzene (56,000 mt/y).

VIRGIN ISLANDS

ST CROIX PETROCHEMICAL CORP.
(joint venture Amerada Hess Corp. and Hercofina)

St. Croix. Feed: mixed xylenes. Product: paraxylene (275,000 mt/y).

YUGOSLAVIA

DOW CHEMICAL CO.

Zagreb. Product: polystyrene.

OGJ REPORT

FORECAST REVIEW

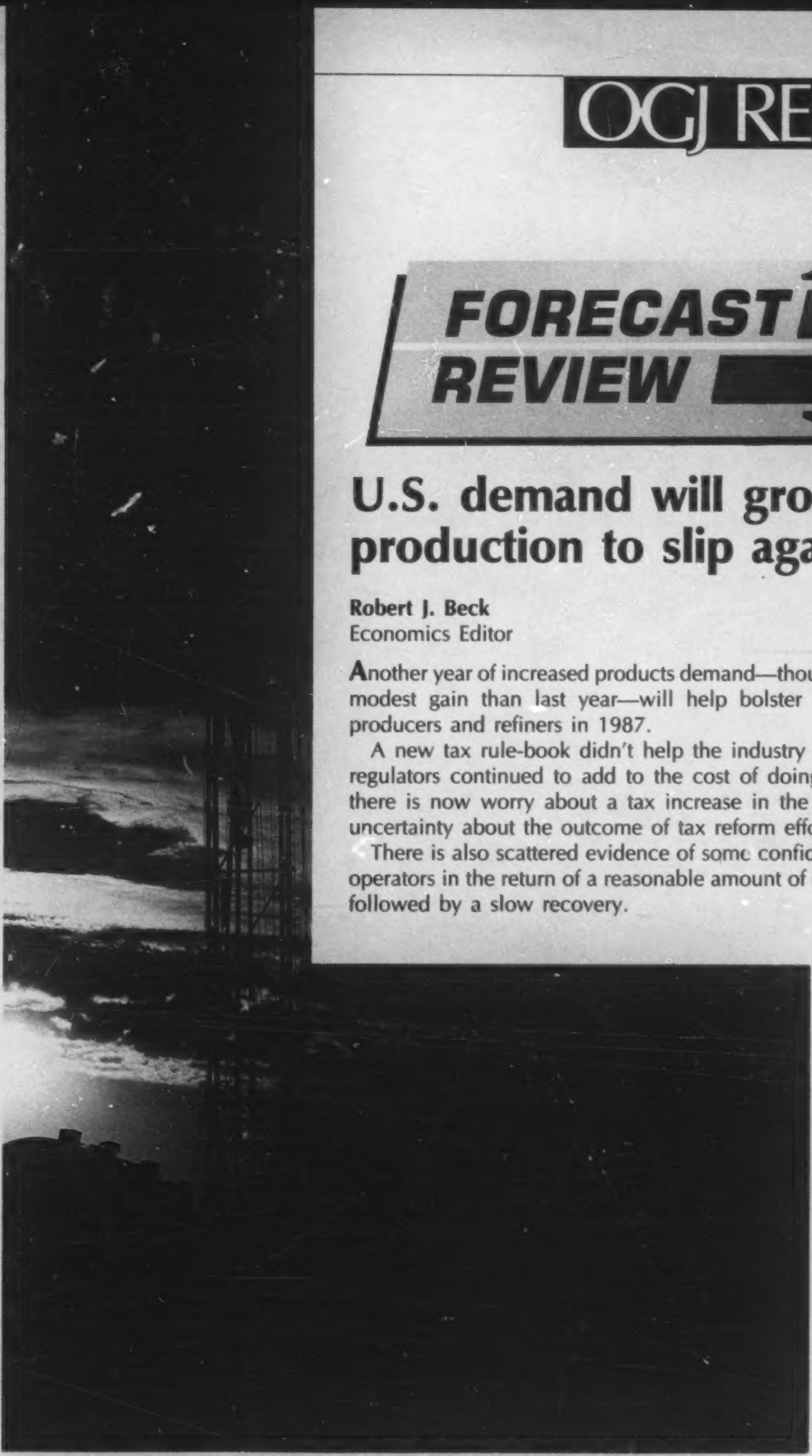
U.S. demand will grow, production to slip again in '87

Robert J. Beck
Economics Editor

Another year of increased products demand—though it will be a more modest gain than last year—will help bolster the hopes of U.S. producers and refiners in 1987.

A new tax rule-book didn't help the industry any, and last year, regulators continued to add to the cost of doing business. Though there is now worry about a tax increase in the future, at least the uncertainty about the outcome of tax reform efforts is finally gone.

There is also scattered evidence of some confidence on the part of operators in the return of a reasonable amount of crude price stability followed by a slow recovery.



Development well was being drilled late last year in the Casey field in northeast Kansas by Miura Petroleum Co.
Staff photo by G. Alan Petzet.

U.S. energy demand

	1985 — Trillion BTU —	1986	% change 1986/85	1987 trillion BTU	% change 1987/86	% share of market 1987
Oil	30,922	31,835	+ 3.0	32,460	+ 2.0	43.1
Natural gas	17,854	16,955	− 5.0	17,040	+ 0.5	22.6
Coal	17,483	17,400	− 0.5	17,650	+ 1.4	23.4
Hydro & geothermal	3,521	3,630	+ 3.1	3,710	+ 2.2	4.9
Nuclear	4,160	4,330	+ 4.1	4,550	+ 5.1	6.0
Total	**73,938**	**74,150**	**0.3**	**75,410**	**1.7**	**100.0**

Source: 1985 DOE; 1986 and 1987 OGJ estimates

U.S. natural gas supply and demand

	1984	1985 — Billion cu ft —	1986	% change 1986/85	1987 Billion cu ft	% change 1987/86
Production						
Texas	6,185	6,053	6,200	+ 2.4	6,200	—
Louisiana	5,825	5,014	4,770	− 4.8	4,770	—
Other states	6,220	6,131	5,695	− 7.1	5,735	+ 0.7
Total production	**18,230**	**17,198**	**16,665**	**− 3.1**	**16,705**	**+ 0.2**
Imports						
Canada	755	926	760	−17.9	800	+ 5.3
Mexico	52	0	0	—	0	—
LNG Algeria	36	24	0	—	0	—
Total imports	**843**	**950**	**760**	**−20.0**	**800**	**+ 5.3**
Supplemental gas	110	126	150	+19.0	150	—
Losses, etc.*	−980	−1,172	−1,100	− 6.1	−1,100	—
Total supply	**18,203**	**17,102**	**16,475**	**− 3.7**	**16,555**	**+ 0.5**
Exports	55	55	55	—	55	—
Stock change	197	−234	—	—	—	—
Total consumption	**17,951**	**17,281**	**16,420**	**− 5.0**	**16,500**	**+ 0.5**

* Extraction losses, nonfuel gas and unaccounted for gas.
Source: 1984 and 1985, DOE: 1986 and 1987 OGJ estimates

Prices may not stabilize until well into the year, and they may not reach a level that will encourage exploration and development even in 1987.

But after the trauma of 1986, the return of even a little confidence in the future means a lot, even if that future is another year away for many.

And the Journal's estimate is that it will be.

As demand grows this year, U.S. production will dwindle and crude and products imports will account for an increasing share of the nation's requirements. And at least in 1987, there is little prospect for increased drilling activity; exploration drilling will remain on the critical list.

Here are highlights of OGJ's forecast for 1987:

- Total U.S. energy demand will increase 1.7% to 75.41 quadrillion BTU (quads). Consumption of all types of energy will increase; nuclear will grow at the highest rate with a 5.1% gain.
- U.S. petroleum product demand will increase 2.0% in 1987 to 16.51 million b/d, the highest level since 1980.
- Crude and condensate production in the U.S. is expected to fall even faster this year than it did in 1986, declining 4.4% to 8.340 million b/d. Last year, production declined 2.7%.
- The result of these two trends is a continuing rise in imports in 1987. The increase is expected to be 7.6% to 6.5 million b/d.
- U.S. gas consumption will increase only 0.5% this year to 16.5 tcf; production will gain only 0.2% to 16.705 tcf.
- Refinery input to stills will increase 2.2% to 13.1 million b/d in 1987, while capacity of U.S. refineries is expected to be up only slightly to 15.6 million b/d. Net result will be a small improvement in utilization.
- Continued low prices and financial difficulties will keep drilling activity at a low level through the year. Annual active rotary rig count is expected to average only 950 this year, compared with 965 in 1986.
- Well completions will, therefore, drop to an estimated 43,050. Wildcat drilling will suffer the most.

Energy and the economy. An expected increase in economic activity in the U.S. in 1987 will help push energy demand. Real gross national product (GNP) in constant 1982 dollars is forecast to increase 2.8% to $3.783 trillion. The rate of increase is similar to that of the past two years, 2.7% in 1985 and an estimated 2.6% in 1986.

Industrial production is also expected to increase at a faster rate this year, 2.6% compared to only 0.3% in 1986. This growth is slightly slower than that of the economy as a whole, but should still be a boost to overall energy demand.

Energy consumption per dollar of real GNP, however, will fall for the 17th consecutive year in 1987, dropping to 19,930 BTU. Investment in energy conservation in all segments of the economy has had a cumulative and long-lasting effect on energy consumption. But lower energy prices in 1987 will slow the rate of improvement in energy efficiency.

The 1987 increase will be the fifth consecutive year of economic growth for the U.S. economy. Lower interest rates and a lower rate of inflation in recent years have helped keep the economy growing. These factors should also help economic growth in 1987.

The GNP implicit price deflator increased 2.7% in 1986 following a 3.3% growth in 1985. It is expected to move up slightly faster in 1987 at 3%. The lower rate of inflation, if sustained, will reduce uncertainty and stimulate business investment and consumer spending.

Oil's share of the energy market, which dropped from 48.7% in 1977 to 41.8% in 1985, regained some of that lost share in 1986 as oil consumption increased faster than the economy. With 42.9% of the energy market now, oil's share is expected to increase again in 1987 to 43.1%.

Some of the increase in oil's market share came at the expense of natural gas. Natural gas lost its price advantage in some sectors and significant volumes were displaced in the utility and heavy industry markets.

In 1986, for the first time, the average price steam electric utility plants paid for heavy oil fell below the price for natural gas. The result was substitution of heavy oil for natural gas.

Natural gas consumption declined in 1986 by 5% to 16.955 quads and its share of the energy market dipped to 22.9% from 24.1% the year before. Natural gas consumption is expected to increase slightly this year, but not enough to keep its market share from slipping further to 22.6%.

OGJ forecast of U.S. supply and demand

(Thousands of barrels daily)

	Year 1987	% change 87/86	Year* 1986	% change 86/85	–1st qtr. 1987–		–2nd qtr. 1987–		–3rd qtr. 1987–		–4th qtr. 1987–	
					Volume	% Change	Volume	% Change	Volume	% Change	Volume	% Change
DOMESTIC DEMAND												
Motor gasoline	7,090	+ 1.1	7,010	+ 2.6	6,800	+ 2.5	7,200	+ 1.5	7,290	+ 0.3	7,070	+ 0.4
Dist. 1-4	5,917	+ 1.1	5,855	+ 2.8	5,667	+ 2.7	6,027	+ 1.5	6,075	+ 0.1	5,899	+ 0.1
Dist. 5	1,173	+ 1.6	1,155	+ 1.9	1,133	+ 1.6	1,173	+ 1.5	1,215	+ 1.4	1,171	+ 1.8
Naphtha jet	215	+ 4.9	205	– 4.2	210	+ 9.4	220	+ 6.3	220	+ 6.3	210	– 1.9
Dist. 1-4	155	+ 6.9	145	– 5.8	152	+12.6	158	+10.5	159	+10.4	151	– 4.4
Dist. 5	60	—	60	—	58	+ 1.8	62	– 3.1	61	– 3.2	59	+ 5.4
Kerosine jet	1,155	+ 3.6	1,115	+10.9	1,110	+ 4.6	1,120	+ 5.3	1,180	+ 5.4	1,210	– 0.4
Dist. 1-4	840	+ 3.7	810	+10.5	810	+ 3.6	815	+ 5.6	855	+ 6.7	880	– 0.8
Dist. 5	315	+ 3.3	305	+12.1	300	+ 7.5	305	+ 4.5	325	+ 1.9	330	+ 0.6
Distillate	3,010	+ 2.7	2,930	+ 2.2	3,420	+ 4.0	2,810	+ 2.9	2,650	+ 3.0	3,160	+ 1.0
Dist. 1-4	2,608	+ 2.8	2,536	+ 1.9	3,046	+ 4.2	2,383	+ 3.1	2,240	+ 3.1	2,763	+ 0.9
Dist. 5	402	+ 2.0	394	+ 3.7	374	+ 2.2	427	+ 2.2	410	+ 2.2	397	+ 1.8
Residual	1,380	—	1,380	+14.8	1,430	+ 0.4	1,350	+ 1.0	1,360	– 4.8	1,380	+ 3.7
Dist. 1-4	1,090	+ 0.1	1,089	+13.2	1,140	– 0.3	1,060	+ 3.5	1,070	– 5.9	1,090	+ 3.7
Dist. 5	290	– 0.3	291	+21.3	290	+ 3.2	290	– 7.1	290	– 0.7	290	+ 3.6
LPG and ethane	1,580	+ 3.9	1,520	– 4.9	1,750	+ 3.2	1,400	+ 4.4	1,390	+ 4.4	1,780	+ 4.0
Dist. 1-4	1,527	+ 4.1	1,467	– 5.1	1,690	+ 3.6	1,350	+ 4.5	1,345	+ 4.8	1,723	+ 3.7
Dist. 5	53	—	53	—	60	– 4.8	50	+ 2.0	45	– 8.2	57	+14.0
Misc. products	2,080	+ 2.5	2,030	+ 1.1	1,810	+ 2.7	2,140	+ 2.2	2,300	+ 2.6	2,070	+ 2.4
Dist. 1-4	1,750	+ 2.0	1,715	+ 2.0	1,490	+ 2.3	1,810	+ 1.7	1,960	+ 2.2	1,740	+ 1.9
Dist. 5	330	+ 4.8	315	– 3.4	320	+ 4.6	330	+ 5.1	340	+ 4.6	330	+ 4.8
TOTAL DOMESTIC DEMAND	**16,510**	**+ 2.0**	**16,190**	**+ 3.0**	**16,530**	**+ 3.0**	**16,240**	**+ 2.4**	**16,390**	**+ 1.3**	**16,880**	**+ 1.3**
Dist. 1-4	13,887	+ 2.0	13,617	+ 2.7	13,995	+ 3.0	13,603	+ 2.6	13,704	+ 1.3	14,246	+ 1.0
Dist. 5	2,623	+ 1.9	2,573	+ 4.4	2,535	+ 2.8	2,637	+ 1.2	2,686	+ 1.5	2,634	+ 2.5
EXPORTS	**760**	**+ 0.7**	**755**	**– 3.1**	**810**	—	**730**	**+ 1.1**	**740**	**+ 0.1**	**760**	**+ 1.3**
Dist. 1-4	360	+ 1.1	356	+ 3.5	395	—	335	+ 2.1	350	+ 0.6	360	+ 1.4
Dist. 5	400	+ 0.3	399	– 8.3	415	—	395	+ 0.3	390	– 0.3	400	+ 1.3
TOTAL DEMAND	**17,270**	**+ 1.9**	**16,945**	**+ 2.7**	**17,340**	**+ 2.8**	**16,970**	**+ 2.3**	**17,130**	**+ 1.3**	**17,640**	**+ 1.3**
Dist. 1-4	14,247	+ 2.0	13,973	+ 2.7	14,390	+ 2.9	13,938	+ 2.6	14,054	+ 1.3	14,606	+ 1.1
Dist. 5	3,023	+ 1.7	2,972	+ 2.5	2,950	+ 2.4	3,032	+ 1.1	3,076	+ 1.3	3,034	+ 2.4
SUPPLY												
Crude & condensate	8,340	– 4.4	8,725	– 2.7	8,390	– 7.1	8,360	– 4.5	8,320	– 2.0	8,290	– 3.8
Dist. 1-4	5,250	– 8.2	5,722	– 4.3	5,320	–12.0	5,280	– 7.9	5,230	– 6.3	5,180	– 6.9
Dist. 5	3,090	+ 2.9	3,003	+ 0.3	3,070	+ 2.6	3,080	+ 2.0	3,090	+ 6.2	3,120	+ 1.9
NGL and other hydrocar.	1,600	– 1.2	1,620	– 2.6	1,610	– 6.7	1,590	– 2.0	1,590	+ 1.1	1,610	+ 3.3
Dist. 1-4	1,557	– 1.2	1,576	– 2.2	1,565	– 7.0	1,548	– 8.8	1,548	+ 1.2	1,567	+ 3.4
Dist. 5	43	– 2.3	44	–17.0	45	+ 4.7	42	– 9.7	42	– 2.3	43	– 2.3
IMPORTS												
Crude	4,575	+10.9	4,125	+33.8	4,050	+32.1	4,690	+14.9	4,860	+ 1.9	4,700	+ 2.6
Dist. 1-4	4,375	+11.2	3,935	+35.3	3,860	+33.2	4,480	+14.8	4,660	+ 2.2	4,500	+ 2.7
Dist. 5	200	+ 5.3	190	+ 9.2	190	+13.1	210	+17.3	200	– 5.2	200	– 1.0
Products and unfinished	1,925	+ 0.5	1,915	+ 2.7	1,900	+ 7.3	1,910	+ 0.3	1,940	– 8.7	1,950	+ 4.9
Dist. 1-4	1,805	+ 0.6	1,795	+ 2.6	1,790	+ 6.6	1,790	+ 1.8	1,815	– 9.5	1,825	+ 4.9
Dist. 5	120	—	120	+ 3.4	110	+19.6	120	–18.4	125	+ 4.2	125	+ 4.2
TOTAL IMPORTS	**6,500**	**+ 7.6**	**6,040**	**+22.1**	**5,950**	**+23.0**	**6,600**	**+10.2**	**6,800**	**– 1.4**	**6,650**	**+ 3.2**
Dist. 1-4	6,180	+ 7.9	5,730	+23.0	5,650	+23.4	6,270	+10.7	6,475	– 1.4	6,325	+ 3.4
Dist. 5	320	+ 3.2	310	+ 6.9	300	+15.4	330	+ 1.2	325	– 1.8	325	+ 0.9
Processing gain, loss, etc.	775	+ 2.0	760	+ 8.3	800	–19.7	750	+ 9.3	750	+36.4	800	– 1.0
Dist. 1-4	605	+ 2.2	592	+ 0.7	620	–14.0	590	+ 9.3	580	+24.2	630	– 1.3
Dist. 5	170	+ 1.2	168	+47.4	180	–34.5	160	+ 9.6	170	+104.8	170	—
TOTAL NEW SUPPLY	**17,215**	**+ 0.4**	**17,145**	**+ 5.3**	**16,750**	**+ 0.9**	**17,300**	**+ 1.4**	**17,460**	**– 0.3**	**17,350**	**– 0.4**
Dist. 1-4	13,592	– 0.2	13,620	+ 6.1	13,155	+ 1.0	13,688	+ 1.3	13,833	– 2.2	13,692	– 1.0
Dist. 5	3,623	+ 2.8	3,525	+ 2.1	3,595	+ 0.7	3,612	+ 2.1	3,627	+ 7.7	3,658	+ 1.6
STOCK CHANGE	**(55)**	—	**200**	—	**(590)**	—	**330**	—	**330**	—	**(290)**	—
Dist. 1-4	(655)	—	(353)	—	(1,235)	—	(250)	—	(221)	—	(914)	—
Dist. 5	600	—	553	—	645	—	580	—	551	—	624	—
CRUDE RUNS TO STILLS	**12,950**	**+ 2.0**	**12,700**	**+ 5.8**	**12,500**	**+ 4.3**	**13,060**	**+ 0.5**	**13,200**	**+ 0.8**	**13,040**	**+ 2.5**
TOTAL INPUT TO STILLS	**13,100**	**+ 2.2**	**12,820**	**+ 5.4**	**12,650**	**+ 4.3**	**13,210**	**+ 1.1**	**13,350**	**+ 1.1**	**13,190**	**+ 2.4**
TOTAL REFINING CAPACITY	**15,600**	**+ 0.6**	**15,510**	**– 1.0**	**15,600**	**+ 0.4**	**15,600**	**+ 0.8**	**15,600**	**+ 1.1**	**15,600**	—
REFINING UTILIZATION (%)	**84.0**	**+ 1.6**	**82.7**	**+ 6.6**	**81.1**	**+ 3.8**	**84.7**	**+ 0.3**	**85.6**	—	**84.6**	**+ 2.4**
TOTAL INDUSTRY STOCKS†	**1,079**	**– 1.8**	**1,099**	**+ 7.1**	**1,046**	**+ 5.4**	**1,076**	**+ 3.6**	**1,106**	**– 0.7**	**1,079**	**– 1.8**
Products	739	– 2.6	759	+ 7.7	716	+10.0	736	+ 3.1	766	– 1.3	739	– 2.6
Crude	340	—	340	+ 5.9	330	– 3.2	340	+ 4.6	340	+ 0.6	340	—
SPR stocks†	530	+ 3.9	510	+ 3.4	515	+ 3.6	520	+ 3.6	525	+ 3.8	530	+ 3.9

*Preliminary. †Million bbl at end of period.

Prices

	Crude oil		Products		Natural gas	
Year	Average U.S. wellhead price	Average landed cost of imports	Regular gasoline pump price	No. 2 fuel oil wholesale price	Average wellhead price	Average consumer price
	($/bbl)		(¢/gal)		($/Mcf)	
1976	8.19	13.34	59.0	N.A.	0.58	1.47
1977	8.57	14.31	62.2	N.A.	0.79	1.78
1978	9.00	14.38	62.6	36.9	0.91	1.98
1979	12.64	21.65	85.7	56.9	1.18	2.34
1980	21.59	33.95	119.1	80.3	1.59	2.91
1981	31.77	36.52	131.1	97.6	1.98	3.51
1982	28.52	33.18	122.2	91.4	2.46	4.32
1983	26.19	28.93	115.7	81.5	2.59	4.82
1984	25.88	28.46	112.9	82.1	2.66	4.85
1985	24.08	26.60	111.5	77.6	2.53	4.81
1986*	12.55	13.60	85.9	46.5	1.75	3.70

*Estimated.
Source: 1976-1985, DOE; 1986 OGJ estimates

U.S. energy efficiency

Year	GNP (Billion 1982 dollars)	Energy consumption (Trillion BTU)	Energy consumption per GNP dollar (Thousand BTU)	Oil energy consumption (Trillion BTU)	Oil energy consumption per GNP dollar (Thousand BTU)
1970	2,416	67,143	27.8	29,537	12.2
1971	2,485	68,348	27.5	30,570	12.3
1972	2,609	71,643	27.5	32,966	12.6
1973	2,744	74,282	27.1	34,840	12.7
1974	2,729	72,543	26.6	33,455	12.3
1975	2,695	70,546	26.2	32,731	12.1
1976	2,827	74,362	26.3	35,175	12.4
1977	2,959	76,289	25.8	37,122	12.5
1978	3,115	78,088	25.1	37,965	12.2
1979	3,192	78,898	24.7	37,123	11.6
1980	3,187	75,952	23.8	34,202	10.7
1981	3,249	73,989	22.8	31,931	9.8
1982	3,166	70,840	22.4	30,232	9.5
1983	3,279	70,495	21.5	30,054	9.2
1984	3,490	74,071	21.2	31,051	8.9
1985	3,585	73,939	20.6	30,922	8.6
1986*	3,679	74,150	20.1	31,835	8.7
1987†	3,783	75,410	19.9	32,460	8.6

*Estimated. †Forecast.
Source: 1970-1985 DOE; 1986 and 1987 OGJ estimates

Coal consumption declined last year by 0.5% to the equivalent of 17.65 quads, but it still became the second leading source of fuel, capturing second place from gas with 23.5% of the market.

Coal consumption has been on a steady climb since 1975, when its market share was 18%. And it will continue to grow this year, though not as fast as other energy sources.

Nuclear power's expected growth of 5.1% in 1987 follows a 4.1% increase last year. Nuclear power now provides close to 16% of U.S. electricity generation, and its share of the U.S. energy market will reach 6% this year.

Hydroelectric and geothermal power demand will total 3.71 quads in 1987, up 2.2%.

Petroleum demand. Lower prices for crude oil and petroleum products coupled with a moderate increase in economic activity fueled petroleum demand in the U.S. during 1986. This same combination is expected to continue to stimulate consumption this year.

Increases are expected in all major product categories except residual fuel oil which, after a healthy surge in 1986, will remain at last year's level.

Including exports, total demand will average 17.27 million b/d, up 1.9% from a year ago. Exports are projected to average 760,000 b/d compared with 755,000 b/d last year. The level of exports has ranged from 722,000 b/d to 815,000 b/d over the past 5 years.

U.S. demand jumped in 1986 as prices fell, increasing 3.0% to 16.19 million b/d. Demand dropped for five years from the peak of 18.847 million b/d in 1978 to 15.231 million b/d in 1983, then began a gradual growth.

For the first time in the last 9 years, the rate of growth in petroleum product demand last year exceeded growth in the economy. But this year, petroleum product demand is expected to again lag economic growth. Energy conservation is the key reason petroleum demand growth has remained below economic growth in recent years.

Also for the first time in 9 years, resid demand increased in 1986. It was the leading contributor to higher overall demand with a 14.8% gain to 1.38 million b/d.

Production drops further. U.S. crude production followed prices down during 1986, tumbling from 9.1 million b/d in the first quarter to 8.55 million b/d in the fourth quarter.

For the year, output is estimated at an average of 8.725 million b/d, down 2.7%. The average for 1986 reflects the high production rate in the first quarter, before the impact of the sharp drop in oil prices.

Oil & Gas Journal is forecasting U.S. oil production will fall even faster this year, dropping 4.4% to 8.34 million b/d.

Natural gas liquids (NGL) production is also expected to continue to slip. Output of NGL and other hydrocarbon liquids fell 2.6% to 1.62 million b/d in 1986, and is expected to dip another 1.2% to 1.6 million b/d in 1987 due to low gas production and low prices.

The result will be a 3.9% drop in U.S. total liquids production to 9.94 million b/d in 1987. Total liquids production was 10.635 million b/d in 1985.

Last year's decline in domestic crude and lease condensate production followed four consecutive increases that lifted output from 8.572 million b/d in 1981 to 8.971 million b/d in 1985. That 4.7% increase was due to the surge in U.S. drilling from 1979 through 1983 resulting from higher oil prices.

But the plunge in drilling activity last year, coupled with the shutting in of many marginal wells, caused a sharp drop in output. The 1986 decline wiped out 246,000 b/d, or 61% of the 4-year increase from 1981 to 1985.

The remainder of that production gain is expected to be lost this year as the U.S. production decline accelerates.

The 1986 drop came in spite of an increase in Alaska. Production there gained about 39,000 b/d last year, and is expected to increase further to 1.887 million b/d in 1987. An additional 28,000 b/d expected from the

U.S. production of crude oil and lease condensate

	1986*	1985	1984	1983	1982	1981	1980	1979	1978	1977	Cumulative 1859-1986 1,000 bbl
	1,000 b/d										
District 1:											
Fla., N.Y., Pa., W. Va	51	57	63	77	93	117	133	149	145	144	2,599,604
Total Dist. 1	**51**	**57**	**63**	**77**	**93**	**117**	**133**	**149**	**145**	**144**	**2,599,604**
District 2:											
Illinois	79	83	79	80	76	66	62	60	63	71	3,314,364
Indiana	15	14	15	15	15	13	14	11	13	14	506,018
Kansas	186	207	207	196	193	181	164	156	153	158	5,476,170
Kentucky	18	21	21	22	20	18	16	15	15	18	701,572
Michigan	76	75	83	87	86	89	92	93	92	90	1,018,917
Nebraska	18	19	18	17	19	18	17	17	16	16	423,294
North Dakota	130	139	144	139	129	124	110	84	64	64	890,421
Ohio	41	41	42	41	40	37	35	35	34	33	957,605
Oklahoma	402	446	460	435	435	422	410	393	418	428	12,841,682
Others†	7	7	8	7	7	7	4	4	4	4	32,097
Total Dist. 2	**972**	**1,052**	**1,077**	**1,039**	**1,020**	**975**	**924**	**868**	**872**	**896**	**26,162,440**
District 3:											
Alabama	59	59	54	51	55	57	61	52	53	50	364,379
Arkansas	47	52	51	52	52	50	50	52	56	55	1,603,174
Louisiana	1,415	1,393	1,408	1,314	1,256	1,231	1,283	1,355	1,460	1,542	19,772,731
Gulf Coast	1,330	1,307	1,318	1,222	1,159	1,135	1,194	1,267	1,363	1,441	...
Rest of state	85	86	90	92	97	96	89	88	97	101	...
Mississippi	82	84	90	86	91	94	98	105	110	118	1,903,33
New Mexico	209	215	216	206	195	196	206	217	230	239	4,003,00
Texas	2,292	2,435	2,472	2,473	2,535	2,589	2,672	2,776	2,948	3,117	50,392,818
Gulf Coast	404	428	447	460	476	482	484	488	651	686	...
West Texas	1,266	1,315	1,329	1,335	1,378	1,427	1,503	1,588	1,557	1,037	...
East Texas field	120	129	134	140	145	154	160	165	170	177	...
Rest of state	502	563	562	538	536	526	525	535	570	617	...
Total Dist. 3	**4,104**	**4,238**	**4,291**	**4,182**	**4,184**	**4,217**	**4,370**	**4,557**	**4,857**	**5,121**	**78,039,444**
District 4:											
Colorado	78	83	79	80	84	83	81	89	101	108	1,470,524
Montana	80	82	81	80	85	84	81	82	82	90	1,227,452
Utah	111	112	95	81	61	71	68	75	84	90	897,471
Wyoming	326	352	339	324	324	358	345	361	376	306	5,423,863
Total Dist. 4	**594**	**629**	**594**	**565**	**554**	**596**	**575**	**607**	**643**	**594**	**9,019,310**
District 5:											
Alaska	1,865	1,826	1,722	1,713	1,696	1,609	1,617	1,402	1,245	463	6,271,445
California	1,130	1,161	1,126	1,109	1,099	1,055	975	966	935	958	21,245,827
Coastal region	186	206	208	208	210	185	160	169	172	186	...
L.A. region	205	214	217	214	219	222	227	242	259	280	...
San Joaquin	739	742	701	687	670	648	588	555	504	492	...
Nevada	8	8	5	2	2	2	2	3	3	2	17,135
Others§	(s)	(s)	1	1	1	1	1	1	1	1	20,368
Total Dist. 5	**3,003**	**2,995**	**2,854**	**2,825**	**2,798**	**2,667**	**2,595**	**2,372**	**2,184**	**1,424**	**27,554,775**
U.S. total	**8,725**	**8,971**	**8,879**	**8,688**	**8,649**	**8,572**	**8,597**	**8,553**	**8,701**	**8,179**	**143,375,572**

(s) Less than 500 b/d.

*Preliminary. †Includes Missouri, South Dakota, and Tennessee. §Includes Arizona and Washington.

Supply and demand for crude in the U.S.

	1986*	1985	1984	1983	1982	1981	1980	1979	1978	1977
	1,000 b/d									
SUPPLY										
Crude imports†	4,172	3,201	3,426	3,330	3,488	4,396	5,263	6,519	6,356	6,615
Crude production	8,725	8,971	8,879	8,688	8,649	8,572	8,597	8,552	8,707	8,245
Unaccounted for crude	125	145	185	114	71	83	93	− 11	− 57	− 6
Total supply	**13,022**	**12,317**	**12,490**	**12,132**	**12,208**	**13,051**	**13,953**	**15,060**	**15,006**	**14,854**
DEMAND										
Crude refinery runs	12,700	12,002	12,044	11,685	11,774	12,470	13,481	14,648	14,739	14,602
Crude used directly and loss	55	61	65	66	62	63	28	29	30	30
Crude exports	165	204	181	164	236	228	287	235	158	50
Crude into SPR	47	118	195	234	175	336	45	67	163	20
Total demand	**12,967**	**12,385**	**12,465**	**12,149**	**12,247**	**13,097**	**13,841**	**14,979**	**15,090**	**14,702**
Crude stock change (Industry)	55	− 68	5	− 17	− 39	− 46	112	81	− 84	152
Crude stocks (million bbl)										
Primary§	340	320	345	343	350	363	380	339	309	340
SPR	510	493	450	379	294	230	108	91	67	7

*Preliminary. †Includes imports for the Strategic Petroleum Reserve. §Includes Alaskan crude in transit as of 1980.

Crude imports by country of origin*

	1986†	1985	1984	1983	1982	1981	1980	1979	1978	1977
	1,000 b/d									
Algeria§	75	84	195	176	90	261	456	608	634	544
Angola	94	104	85	71	42	45	37	39	6	17
Australia	14	21	25	0	0	0	0	0	0	0
Canada	558	468	341	274	214	164	199	271	248	279
China	67	36	15	6	8	0	0	13	0	0
Congo	18	16	33	18	1	3	7	2	15	7
Ecuador§	57	56	47	56	32	38	17	30	38	55
Gabon§	21	51	57	59	40	35	25	42	38	35
Indonesia§	292	292	304	315	226	318	314	380	533	507
Iran§	21	27	10	48	35	0	8	297	554	530
Iraq§	79	46	12	10	3	0	28	88	62	74
Libya§	0	0	0	0	23	317	548	642	638	704
Malaysia	11	1	0	3	18	33	61	52	37	55
Mexico	635	715	659	766	645	469	507	435	316	177
Nigeria§	407	280	207	301	510	611	841	1,069	910	1,130
Norway	57	31	112	65	102	114	144	75	104	48
Oman	6	2	10	34	22	24	24	37	61	74
Peru	12	12	1	8	21	30	40	40	19	0
Saudi Arabia§	612	132	309	321	530	1,112	1,250	1,347	1,142	1,373
Trinidad & Tobago	97	98	87	83	92	102	115	123	142	134
Tunisia	2	12	0	7	10	11	8	18	12	29
United Arab Emirates§	27	35	90	18	81	77	172	261	385	333
United Kingdom	330	278	378	365	441	369	173	197	169	97
Venezuela§	410	306	253	164	155	147	156	293	181	250
Zaire	26	34	31	22	19	16	13	4	1	0
Others	243	65	164	138	129	100	120	136	110	162
Total imports	**4,172**	**3,201**	**3,426**	**3,329**	**3,488**	**4,396**	**5,263**	**6,519**	**6,356**	**6,615**
Total from OPEC	**2,020**	**1,320**	**1,512**	**1,477**	**1,696**	**2,922**	**3,864**	**5,112**	**5,184**	**5,643**

*Includes imports for the Strategic Petroleum Reserve. †Preliminary. §OPEC member.

Imports of refined products

	1986*	1985	1984	1983	1982	1981	1980	1979	1978	1977
	1,000 b/d									
Gasoline	310	381	299	247	197	157	140	181	190	215
Kerosine	8	8	12	11	13	7	10	9	11	19
Jet fuel-kerosine	50	30	47	29	23	31	49	55	67	53
Jet fuel-naphtha	8	9	14	1	5	7	31	22	19	21
Distillate	225	200	272	174	93	173	142	196	173	248
Residual	640	510	682	699	776	800	941	1,150	1,355	1,350
Unfinished oils	250	318	231	234	174	112	55	56	27	31
Other†	425	411	459	327	344	312	283	264	165	239
Total U.S.	**1,915**	**1,866**	**2,016**	**1,722**	**1,625**	**1,599**	**1,651**	**1,933**	**2,007**	**2,176**

*Preliminary. †Includes plant condensate.

Exports of refined products and crude

	1986*	1985	1984	1983	1982	1981	1980	1979	1978	1977
	1,000 b/d									
Gasoline	9	10	6	10	20	2	1	1	2	2
Distillate	110	67	51	64	74	5	3	4	3	1
Residual	145	197	191	185	209	118	34	9	13	6
Lubricants	21	15	15	16	16	19	23	24	27	26
Coke	231	187	194	195	156	138	137	146	111	102
Asphalt and road oil	1	0	1	1	1	—	1	—	1	1
LPG	45	62	48	73	65	42	21	15	20	18
Other refined products	28	38	36	31	38	43	39	39	27	37
Total refined products	590	577	542	575	579	367	259	238	204	193
Crude	165	204	181	164	236	228	287	234	158	50
Total exports	**755**	**781**	**723**	**739**	**815**	**595**	**546**	**472**	**362**	**243**

*Preliminary.

North Slope with increased output from Lisburne field will be partially offset by a drop of 6,000 b/d in Cook Inlet production.

California production is also projected to increase this year to 1.195 million b/d. It slipped 31,000 b/d to 1.13 million b/d in 1986 because some heavy crude production was shut in. Increased offshore production will help boost the total this year.

Those two states are the only ones expected to show an increase in 1987; production in all other states is expected to fall a total of 8.2% this year to 5.258 million b/d, after dropping 4.2% in 1986.

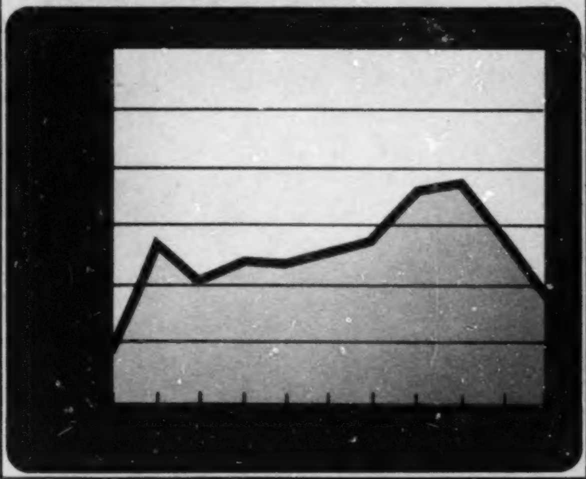
This is the net result of a 13.5% decline in existing production, offset by 412,000 b/d from new oil well drilling.

During 1986, Texas production fell 5.9% to 2.292 million b/d; Oklahoma fell 9.9% to 402,000 b/d; Wyoming was down 7.4% to 326,000 b/d; and Kansas dropped 10.1% to 186,000 b/d.

Imports up. Higher consumption and lower production mean U.S. dependence on foreign oil is growing again. In 1987, imports will represent 39.4% of U.S. demand, up from 37.3% in 1986 and only 31.5% in

Fig. 1

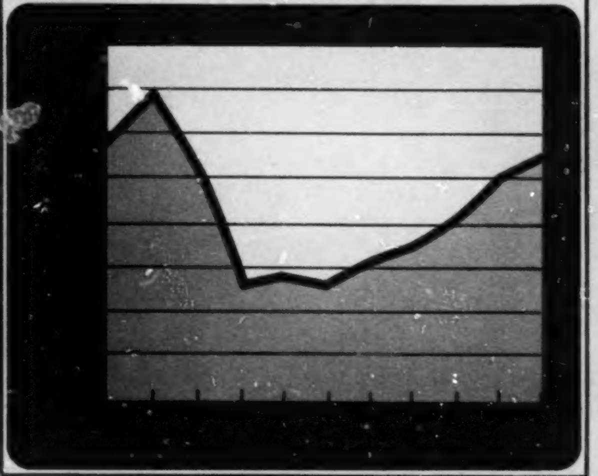
Crude output to drop



26FR-1

Fig. 2

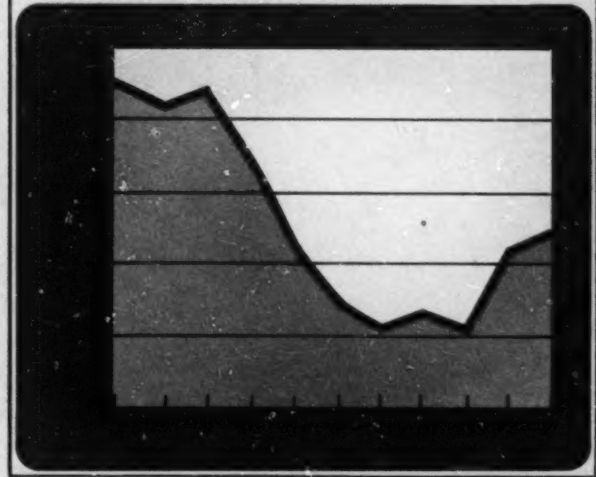
Motor gasoline demand gains



26FR-2

Fig. 3

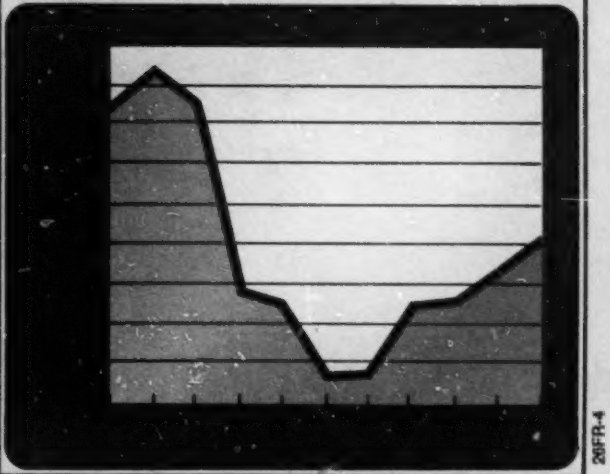
Crude imports up again



26FR-3

Fig. 4

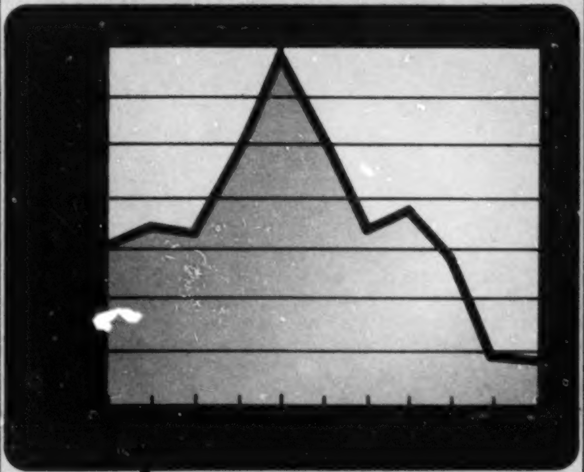
Distillate demand to rise



26FR-4

Fig. 5

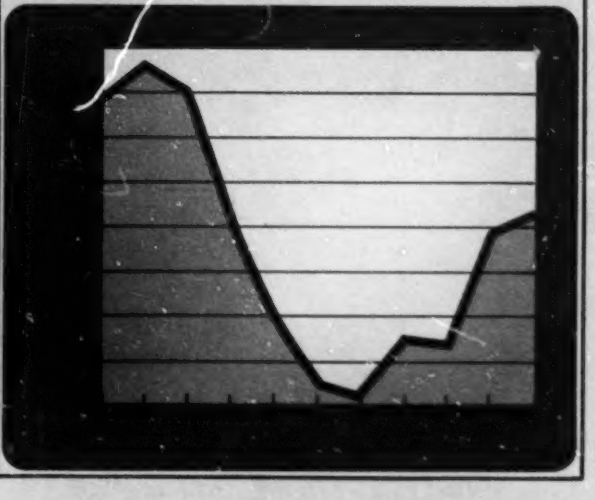
U.S. rig activity still low



26FR-5

Fig. 6

Total demand up



26FR-6

Average rotary rig activity

	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977
Alabama	10.3	22.3	15.5	16.4	15.4	17.3	10.8	12.6	12.5	13.5
Alaska	12.8	20.0	14.0	13.8	21.6	23.5	13.8	13.5	15.5	15.0
Arizona	0.0	0.2	0.2	0.3	1.0	1.1	1.0	0.0	0.4	0.5
Arkansas	5.6	24.0	26.3	25.9	27.0	33.9	26.8	10.4	13.9	14.6
California	49.1	80.0	106.8	105.9	128.7	154.9	120.2	95.6	94.1	89.5
Land	43.8	68.3	88.8	83.7	106.2	133.7	104.7	85.7	86.4	81.3
Offshore	5.3	11.7	18.0	22.3	22.6	21.1	15.5	9.9	7.8	8.2
Colorado	24.3	49.8	53.9	52.3	60.3	81.6	61.1	40.2	41.1	44.7
Florida	2.2	6.7	3.7	4.4	4.6	7.8	4.1	5.3	6.3	6.1
Idaho	1.0	1.3	0.8	1.2	1.5	3.2	2.6	1.8	3.2	1.3
Illinois	5.6	28.4	41.5	60.5	75.5	44.6	25.4	13.1	26.0	15.7
Indiana	1.2	3.6	6.4	5.9	7.1	1.2	0.1	0.3	4.4	3.3
Kansas	46.8	91.4	127.1	124.5	157.4	196.2	120.2	62.5	75.6	67.4
Kentucky	2.5	6.3	7.9	8.3	9.5	5.3	1.7	0.5	3.3	1.7
Louisiana	142.1	282.2	309.9	282.3	342.8	455.6	427.4	347.0	338.3	291.9
North	11.3	24.5	30.1	29.6	39.6	58.0	54.9	34.5	39.8	45.2
Inland waters	41.8	85.4	96.1	81.6	107.8	83.2	76.6	62.1	62.5	56.3
South	20.2	43.4	51.2	47.3	59.2	160.3	156.4	112.3	113.9	81.3
Offshore	68.8	129.0	132.5	123.8	136.3	154.1	139.4	138.2	122.1	109.0
Michigan	24.0	33.5	34.0	29.2	31.4	36.5	30.7	25.1	24.0	24.0
Mississippi	15.3	30.8	32.0	32.8	41.6	71.5	57.6	40.2	44.5	41.7
Montana	9.7	22.7	36.0	23.8	36.2	81.4	49.2	32.9	30.1	27.1
Nebraska	3.1	6.4	8.9	9.0	9.4	15.1	14.3	9.2	9.6	9.2
Nevada	2.9	4.9	4.8	1.1	3.0	4.9	4.6	4.1	2.9	3.1
New Mexico	29.0	71.1	78.0	65.3	103.3	134.9	117.6	87.5	75.5	69.5
New York	2.2	4.8	8.8	10.3	15.2	11.6	7.0	8.7	7.0	7.2
North Dakota	13.3	38.3	50.9	42.3	69.4	118.8	83.4	56.5	39.1	23.8
Ohio	17.5	28.8	51.0	39.7	56.8	97.8	73.7	46.3	45.6	33.3
Oklahoma	141.2	251.3	319.1	285.4	621.5	698.4	397.3	246.8	258.2	233.2
Pennsylvania	17.9	29.5	35.2	22.1	32.6	38.6	29.0	28.9	25.2	14.7
South Dakota	0.6	1.7	2.1	1.0	1.5	2.2	1.9	1.4	2.3	2.7
Texas	310.9	676.6	849.5	797.0	989.5	1,315.8	987.7	770.2	855.1	778.6
Gulf Coast	44.5	101.3	137.9	134.3	168.4	305.0	210.5	141.3	138.7	118.6
Offshore & inland waters	21.7	51.5	59.8	56.3	88.4	74.4	72.1	50.3	46.9	42.0
North	36.5	86.9	124.4	125.0	138.1	170.6	147.2	122.5	153.2	141.9
Panhandle	16.0	37.2	49.6	48.4	66.2	66.5	50.8	48.1	60.4	42.2
East	45.4	77.2	101.8	102.2	116.5	163.7	119.8	107.1	116.6	73.3
West Central	41.7	81.8	99.7	102.6	139.4	191.4	140.4	109.4	124.7	136.5
West	105.1	240.7	276.4	228.2	272.5	344.3	247.1	191.7	214.5	224.2
Utah	11.1	28.5	45.5	36.7	39.8	69.2	42.4	28.9	32.1	29.5
West Virginia	15.0	26.1	37.9	34.2	49.4	44.8	37.8	29.8	27.1	16.5
Wyoming	35.4	92.1	114.5	95.8	142.7	191.3	155.5	147.2	136.4	118.0
Others	6.9	4.9	5.2	4.5	6.7	9.1	2.7	3.7	2.8	3.6
Total U.S.	**963.5**	**1,968.5**	**2,428.3**	**2,232.3**	**3,104.9**	**3,969.5**	**2,910.3**	**2,177.2**	**2,258.4**	**2,001.5**
Canada-land	174.8	302.1	242.8	189.5	195.0	258.7	396.4	334.6	270.2	217.2
Canada-offshore	4.1	9.1	13.5	10.4	5.4	4.8	4.7	4.1	1.5	0.7
Grand total	**1,142.5**	**2,279.7**	**2,684.6**	**2,432.2**	**3,305.3**	**4,232.9**	**3,311.4**	**2,515.9**	**2,530.2**	**2,219.4**

Source: Hughes Tool Co. Note: May not add due to independent rounding.

1985. Imports peaked in 1977 at 8.786 million b/d, 47.7% of demand.

Total imports increased 22.1% in 1986, as production dropped and demand increased. In addition, refiners took advantage of low prices to replenish inventories. The result was a jump in total imports to 6.04 million b/d last year from 4.948 million b/d in 1985. Crude imports gained 33.8% to 4.125 million b/d; product imports were up 2.7% to 1.915 million b/d.

Total imports are expected to increase again this year, by 7.6% to 6.5 million b/d. Crude imports will be up 10.9% to 4.575 million b/d, while product imports will gain only 0.5% to 1.925 million b/d. A slight decline in stock levels—instead of the large 1986 increase—will partially fill the growing gap between U.S. production and consumption.

Mexico was the leading source of crude oil imports to the U.S. in 1986 at 635,000 b/d, a decline from 715,000 b/d in 1985. Saudi Arabia jumped to second place at 612,000 b/d, up from 132,000 b/d in 1985. Canada dropped to third position with 558,000 b/d compared with 468,000 b/d in 1985.

Total crude oil imports from OPEC countries climbed 53% to 2.02 million b/d, compared to 1.32 million b/d in 1985.

Total products imports increased by 49,000 b/d in 1986 to 1.915 million b/d. Imports of residual fuel oil increased 130,000 b/d to 640,000 b/d, while gasoline imports fell by 71,000 b/d. Resid imports had been falling steadily along with demand since 1978; the increase last year reflected the resurgence of resid demand. Gasoline imports surged in 1985, but fell back to 310,000 b/d last year.

Refining and stocks. Part of the increase in imports during 1986 was a result of U.S. refiners building stocks. In 1985, stocks were at minimum levels in relation to demand.

Industry stocks in the U.S. increased by 73 million bbl last year—crude stocks grew by 19 million bbl to 340 million bbl; product stocks by 54 million bbl to 759 million bbl.

This increase in stocks added about 200,000 b/d to imports during 1986.

Refiners generally hold stocks at a minimum to cut costs, but stock levels must be sufficient to meet surges in demand resulting from changiing weather or other factors.

Last year, rising demand was partly the cause of an increase in stocks. But extremely low crude prices also encouraged refiners to further build stocks at low cost.

U.S. refiners are expected to reduce stocks slightly in 1987. Total stocks are projected to fall 20 million bbl during the year to 1,079 million bbl; all of the reduction will come in product stocks, which will drop to 739 million bbl.

Crude runs will increase this year as demand rises. The 5.8% increase last year, coupled with a 1% reduction in refining capacity to 15.51 million b/d, boosted the refinery utilization rate to 82.7%. This was a jump from 77.6% in 1985 and a marked improvement from the 1981-1982 period when falling demand and excess refining capacity led to an average utilization rate below 70%.

A small addition has already been

Refinery runs by districts

	1986 Crude runs*	1986 Input to crude stills*	1986 % of operable capacity	1985	1984	1983	1982	1981	1980	1979	1978	1977
	— 1,000 b/d —			Crude runs — 1,000 b/d								
East Coast	1,119	1,124	81.0	1,061	1,019	960	1,103	1,202	1,300	1,478	1,537	1,496
Appalachian Dist. 1....	100	103	91.2	92	87	77	93	132	158	167	180	178
Total Dist. 1	**1,219**	**1,227**	**84.6**	**1,153**	**1,106**	**1,037**	**1,196**	**1,334**	**1,458**	**1,645**	**1,717**	**1,674**
Appalachian Dist. 2....	61	63	95.5	60	58	53	51	54	51	65	60	65
Ill., Ind., Ky.............	1,835	1,838	84.5	1,777	1,784	1,798	1,714	1,803	2,070	2,353	2,425	2,406
Minn., Wisc., Daks.....	292	291	91.8	285	282	253	251	229	238	294	279	267
Okla., Kan., Mo.	625	627	86.7	617	636	642	763	883	945	1,017	1,044	1,040
Total Dist. 2	**2,812**	**2,819**	**85.8**	**2,739**	**2,760**	**2,746**	**2,779**	**2,969**	**3,304**	**3,729**	**3,808**	**3,778**
Texas:												
Inland	475	480	86.2	472	499	474	456	469	445	472	476	477
Gulf Coast	3,002	3,060	83.2	2,750	2,780	2,801	2,726	2,829	3,151	3,462	3,524	3,442
Louisiana Gulf	2,138	2,144	81.8	1,972	2,012	1,862	1,941	2,030	2,091	2,167	2,140	2,158
N. La., Ark.	167	170	67.7	168	177	170	162	163	186	200	214	196
New Mexico	62	66	86.8	60	68	75	77	81	87	89	84	87
Total Dist. 3	**5,844**	**5,920**	**82.6**	**5,422**	**5,536**	**5,382**	**5,362**	**5,572**	**5,960**	**6,390**	**6,438**	**6,360**
Total Dist. 4	**432**	**436**	**81.2**	**432**	**436**	**420**	**416**	**425**	**442**	**477**	**488**	**469**
Total Dist. 5	**2,393**	**2,418**	**79.0**	**2,256**	**2,206**	**2,100**	**2,021**	**2,171**	**2,354**	**2,405**	**2,288**	**2,324**
Total U.S.	**12,700**	**12,820**	**82.7**	**12,002**	**12,044**	**11,685**	**11,774**	**12,471**	**13,518**	**14,646**	**14,739**	**14,605**

*Preliminary.

U.S. refined products, natural gas liquids, and crude stocks

	1986*	1985	1984	1983	1982§	1981	1980	1979	1978	1977
	1,000 bbl									
Gasoline......................	224,200	225,148	246,307	225,042	247,085	256,425	264,011	240,159	240,694	260,624
Motor†	221,500	222,839	243,296	222,434	244,279	253,001	261,327	237,503	237,885	257,578
Aviation†	2,700	2,309	3,011	2,608	2,806	3,424	2,684	2,656	2,809	3,046
Special naphthas	3,300	3,909	2,951	3,153	3,474	3,965	4,929	4,196	4,071	4,034
Kerosine......................	8,500	7,502	11,893	7,861	10,792	11,042	11,568	15,821	14,334	18,015
Distillate	148,000	143,673	161,072	140,263	185,579	191,541	205,113	228,706	216,367	250,280
Residual......................	47,500	50,381	53,000	48,504	68,229	77,992	91,786	95,859	90,204	89,673
Kerosine jet fuel	43,000	33,825	35,118	32,346	32,001	34,011	35,723	32,926	27,707	28,283
Naphtha jet fuel	7,000	7,502	6,861	6,265	7,189	7,054	6,308	5,594	5,960	6,285
Natural gas liquids & LRG	132,000	81,707	108,446	116,817	114,497	150,170	137,460	125,597	134,890	128,518
Unfinished oils............	104,500	106,656	93,506	108,018	105,277	111,348	123,938	117,652	108,723	113,190
Other refined products....	41,000	44,258	41,192	42,429	44,023	46,295	45,426	45,274	53,053	48,577
Total products stocks ...	**759,000**	**704,561**	**760,346**	**730,698**	**818,146**	**889,843**	**926,262**	**911,784**	**896,003**	**947,479**
Crude stocks (ex. SPR).	**340,000**	**320,892**	**345,376**	**343,850**	**350,044**	**363,464**	**358,166**	**339,080**	**309,421**	**339,813**
Total stocks (ex. SPR)..	**1,099,000**	**1,025,453**	**1,105,722**	**1,074,548**	**1,168,190**	**1,253,307**	**1,284,428**	**1,250,864**	**1,205,424**	**1,287,292**
SPR stocks	**510,000**	**493,316**	**450,505**	**379,089**	**293,827**	**230,341**	**107,800**	**91,191**	**66,860**	**7,455**
Total stocks (incl. SPR)....................	**1,609,000**	**1,518,769**	**1,556,227**	**1,453,637**	**1,462,017**	**1,483,648**	**1,392,228**	**1,342,055**	**1,272,284**	**1,294,747**

*Preliminary. †Includes blending components. §Change in Energy Information Administration reporting basis.

made to refining capacity in the U.S. and the average for 1987 is expected to be 15.6 million b/d. But increased throughtput this year is still expected to raise the average utilization rate to 84%.

When demand was growing rapidly in the 1960s and 1970s, the utilization rate was close to 90% of capacity.

Even though U.S. refining capacity is not expected to decline in 1987, there will still be strong competitive pressures which may lead to the shutdown of less-efficient plants.

Product trends. The projected 2% increase in U.S. demand this year will result from increased demand for most petroleum products.

Motor gasoline demand is expected to continue strong in 1987. At 7.01 million b/d last year, it was up 2.6% to the highest level since 1979.

Demand in 1987 is expected to increase another 1.1% to 7.09 million b/d, making it the third highest year on record. Following the peak of 7.412 million b/d in 1978, high prices and increased fuel efficiency drove down motor gasoline consumption by almost 12% to 6.539 million b/d in 1982.

Lower prices and increased economic activity are the major factors boosting demand. They have more than offset the improvement in fleet fuel efficiency.

The average mileage per gallon of fuel has been increasing steadily from 13.1 in 1973 to 17.9 miles/gal in 1985, an increase of 36.6%. In 1987, the average mileage per gallon is expected to be about 18.9.

Average number of miles driven per vehicle fell to 9,002 in 1981, then steadily increased to 9,827 miles/vehicle in 1985. It is expected to increase again in 1987 because of increased economic activity and lower gasoline prices.

In the U.S., the retail price of all

Marketed natural gas production*

	1986†	1985	1984	1983	1982	1981	1980	1979	1978	1977
	MMcfd									
Alabama	288	294	278	249	205	217	178	235	235	157
Alaska	823	880	792	758	698	664	632	605	556	515
Arkansas	397	425	370	349	253	260	306	300	293	285
California	1,330	1,346	1,305	1,137	1,001	1,009	849	680	852	853
Colorado	447	488	474	448	576	527	523	523	503	517
Kansas	1,139	1,405	1,277	1,191	1,177	1,754	2,014	2,186	2,341	2,140
Louisiana	13,425	13,736	15,959	14,609	16,798	18,557	19,013	19,907	20,483	19,767
Michigan	332	361	395	381	419	418	433	438	405	356
Mississippi	388	395	433	414	554	570	508	395	292	227
New Mexico	1,993	2,480	2,623	2,453	2,732	3,078	3,150	3,237	3,217	3,296
Ohio	490	499	510	415	379	387	379	338	313	272
Oklahoma	4,764	5,305	5,440	4,739	5,300	5,531	5,183	5,028	4,859	4,848
Pennsylvania	410	412	454	324	332	335	266	264	266	251
Texas	16,734	16,583	16,945	16,270	17,802	19,205	19,868	19,657	17,940	19,318
W. Virginia	386	397	394	356	416	440	429	412	407	419
Wyoming	1,330	1,141	1,416	1,216	1,503	1,503	1,122	1,135	979	905
Others	982	970	879	779	594	218	597	437	493	443
Total	**45,658**	**47,118**	**49,944**	**46,088**	**50,739**	**54,673**	**55,450**	**55,777**	**54,436**	**54,569**
Volume change	(1,460)	(2,826)	3,856	(4,651)	(3,935)	(777)	(327)	1,341	(133)	348
Percent change	− 3.1	− 5.7	8.4	− 9.2	− 7.2	− 1.4	− 0.6	2.5	− 0.2	0.6
Imports	2,082	2,603	1,762	2,515	2,556	2,477	2,699	3,434	2,645	2,770
Exports	151	151	150	150	142	162	134	153	144	152

*Includes nonhydrocarbon gases. †Preliminary.

grades of gasoline has fallen from an average of $1.353/gal in 1981 to 92.1¢/gal in 1986. Prices will move with the cost of crude, but are not expected to increase significantly in 1987.

Total jet fuel demand is expected to increase 3.8% in 1987 to 1.37 million b/d following an 8.3% increase in 1986. Most of this year's increase will be in demand for kerosine jet fuel used in commercial aviation. Demand for commercial jet fuel increased 10.9% in 1986 and should gain another 3.6% to 1.155 million b/d in 1987.

In 1986, intense competition resulted in low fares, boosting U.S. airline travel; commercial airline revenue passenger miles increased almost 10%. However, consolidation is now reducing competition and fares are expected to increase in 1987. Therefore, the rate of increase in fuel demand will not be as great as last year.

Demand for naphtha jet fuel, used by the military, dropped in 1986 to 205,000 b/d, but is expected to return to about 215,000 b/d in 1987.

Distillate demand is projected to move up at a pace close to that of overall eonomic activity, increasing 2.7% to 3.01 million b/d in 1987. Demand averaged 2.93 million b/d in 1986, up 2.2% over the year before.

The combination of economic growth and lower distillate prices has stimulated demand. Expansion is expected in most segments, but close to half of the projected increase of 80,000 b/d will come from the highway diesel market.

Lower prices have slowed conversions to natural gas and have reduced the incentive for conservation. The wholesale price of No. 2 fuel oil fell from 97.6¢/gal in 1981 to 77.6¢/gal in 1985; then last year the price dropped to 46.5¢/gal.

A key contributor to the substantial increase in total U.S. demand in 1986 was the 14.8% increase in demand for residual fuel oil. Resid demand last year reached 1.38 million b/d and accounted for 38.4% of the increase in total product demand.

This was the first increase since resid consumption peaked in 1977 at 3.071 million b/d, then slid to 1.202 million b/d in 1985. The sharp drop in crude oil and product prices in 1986 caused the reversal. Residual fuel oil became price competitive with natural gas—and even coal in some cases.

In response to this competition, natural gas and coal prices have been falling. Therefore, resid demand is not expected to increase in 1987 but is likely to remain constant at about the 1.38 million b/d level.

At the end of 1985, the spot market price of resid (New York harbor barge price) was $24.25/bbl. The price fell to $9.40/bbl in July and was only $15.25/bbl near the end of 1986.

When the average cost of heavy oil delivered to electric utility plants fell below natural gas for the first time last April, it stimulated demand by electric utilities with multi-fuel capability. Industrial demand also increased because of the lower price.

Demand for LP-gas and ethane is projected to rebound in 1987, gaining 3.9% to 1.58 million b/d. The chemical industry's demand for feedstock will grow as the economy grows, and industrial and residential/commercial demand are also expected to increase.

An increase is also expected in asphalt demand.

Budget problems have delayed some road improvement projects, but higher gasoline taxes have increased funds available for highway repair and construction.

Natural gas. Consumption of natural gas in the U.S. fell 5% in 1986 to 16.42 tcf, after a 3.7% drop in 1985. Intense competitive pressure from cheap fuel oil was a key reason for the decline.

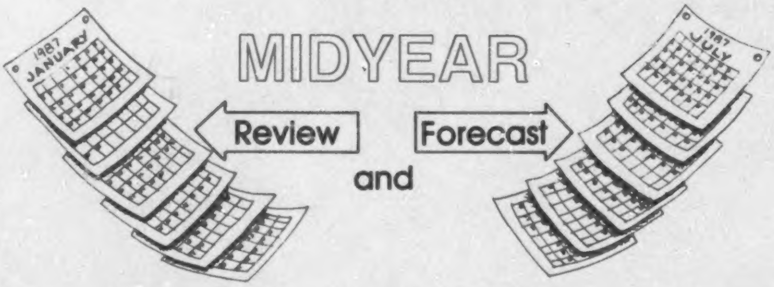
Natural gas prices were also beginning to slide, but because of contract agreements and other factors the adjustment was not as fast as the change in crude prices. The average wellhead price of natural gas fell 22.9% in the first six months of last year, declining to $1.78/Mcf in June. Crude prices plunged about 56% during the same period.

As natural gas prices drop further, demand is expected to stabilize and increase slightly to 16.5 tcf in 1987.

Marketed production of natural gas in the U.S. fell 3.1% in 1986 to 16.665 tcf; it is expected to increase slightly in 1987 to 16.705 tcf.

Imports of natural gas dropped 17.9% last year to 760 bcf; all the imported gas came from Canada. The level of imports in 1987 will depend upon the willingness of the Canadian government to allow producers to compete at the lower natural gas prices. But Canadian imports are expected to gain about 5% this year, to 800 bcf. ▪

OGJ REPORT



Improving oil prices slow changes in U.S. demand, production

Robert J. Beck
Economics Editor

As world oil prices neared the $20/bbl level at mid year, the pendulum began its next swing for most industry segments. By the end of 1987, there is a good chance it will be picking up speed that will carry a recovery for the upstream portion of the industry through at least 1988.

Not a boom, but a recovery—a slow recovery.

Producers will again be starting exploration and development projects, because at today's prices and today's costs, many can be profitable. This increased activity will mean business—maybe even profit before long—for suppliers of equipment and services to upstream operations.

Though completions and rig activity for 1987 will still be lower than in 1986, the last half of the year will see the climb from the bottom begin. Major operators plan to increase drilling over what they planned at the beginning of the year, and independent producers will likely follow suit. Wildcat drilling levels will still be dangerously low.

Not everyone suffered the same when crude prices plummeted, and not everyone will benefit equally as they regain some ground.

The same cycle that brings at least partial upstream recovery will erode the high margins enjoyed by refiners during the past year. U.S. refining capacity is up slightly, and the demand surge brought by low prices is beginning to wane. The result will be a slip in utilization and increased competition in the products market.

Here are some highlights of Oil & Gas Journal's midyear look at 1987:

- Demand for petroleum products in the U.S. will grow more slowly in the second half than in the first; for the year, the gain will be 0.5%.
- Crude and condensate production will continue to slip, averaging 3.7% less this year than in 1986.
- Crude and product imports will both increase during the second half; for the year, crude imports will jump 8.5% over 1986 to 4.48 million b/d.

First half crude, condensate decline again

	1,000 b/d		
	First half 1987*	First half 1986	Change, %
PAD District 1	45	50	−10.0
Florida	24	29	−17.3
Others	21	21	—
PAD District 2	871	1,010	−13.8
Illinois	73	81	− 9.9
Kansas	164	197	−16.8
Michigan	68	73	− 6.8
North Dakota	119	130	− 8.5
Oklahoma	368	433	−15.0
Others	79	96	−17.7
PAD District 3	3,871	4,217	− 8.2
Alabama	57	61	− 6.6
Arkansas	43	45	− 4.5
Louisiana	1,338	1,434	− 6.7
Mississippi	78	83	− 6.0
New Mexico	199	215	− 7.4
Texas	2,156	2,379	− 9.4
PAD District 4	569	619	− 8.1
Colorado	73	83	−12.0
Montana	73	77	− 5.2
Utah	104	113	− 8.0
Wyoming	319	346	− 7.8
PAD District 5	3,034	3,045	− 0.4
Alaska	1,940	1,881	+ 3.1
California	1,085	1,154	− 6.0
Others	9	10	−10.0
Total	**8,390**	**8,941**	**− 6.2**

*Estimated.

Energy consumption and efficiency

Year	GNP, Billion 1982 $	Energy consumption, Trillion BTU	Energy consumption per GNP $, 1,000 BTU	Oil consumption, Trillion BTU	Oil consumption per GNP $, 1,000 BTU
1929	711.8	23,756	33.4	5,521	7.8
1933	501.6	16,900	33.7	4,833	9.6
1940	775.0	23,589	30.4	7,407	9.6
1946	1,077.8	30,494	28.3	10,002	9.3
1950	1,206.6	33,992	28.2	13,489	11.2
1955	1,494.9	39,763	26.6	17,524	11.7
1960	1,665.3	44,569	26.8	20,067	12.1
1965	2,087.6	53,343	25.6	23,242	11.1
1970	2,416.2	67,143	27.8	29,537	12.2
1971	2,484.8	68,348	27.5	30,570	12.3
1972	2,608.5	71,643	27.5	32,966	12.6
1973	2,744.1	74,282	27.1	34,840	12.7
1974	2,729.3	72,543	26.6	33,455	12.3
1975	2,695.0	70,546	26.2	32,731	12.1
1976	2,826.7	74,362	26.3	35,175	12.4
1977	2,958.6	76,289	25.8	37,122	12.5
1978	3,115.2	78,088	25.1	37,965	12.2
1979	3,192.4	78,898	24.7	37,123	11.6
1980	3,187.1	75,952	23.8	34,202	10.7
1981	3,248.8	73,989	22.8	31,931	9.8
1982	3,166.0	70,840	22.4	30,232	9.5
1983	3,277.7	70,495	21.5	30,054	9.2
1984	3,489.9	74,064	21.2	31,051	8.9
1985	3,585.2	73,962	20.6	30,922	8.6
1986	3,674.9	73,873	20.1	31,887	8.7
1987*	3,769.1	74,720	19.8	32,035	8.5
Rates of change, %					
1929-40	+ 8.9	− 0.7	− 9.0	+ 34.2	+ 23.1
1940-50	+ 55.7	+ 44.1	− 7.2	+ 82.1	+ 16.7
1950-70	+ 100.2	+ 97.5	− 1.4	+ 119.0	+ 8.9
1970-86	+ 52.1	+ 10.0	− 27.7	+ 8.0	− 28.7

* Estimate.

- Drilling activity will begin to recover during the second half, but average rig count for the year will still be 4.6% behind 1986—and the lowest on record—at 920.
- Refinery utilization in the U.S. will drop slightly to 82.3%.

1987 overview. The Journal forecasts 1987 U.S. demand for petroleum products at 16.37 million b/d, up 0.5% from 16.281 million b/d in 1986. First half 1987 demand is estimated at 16.23 million b/d, up 0.9% over 1986; second half domestic demand should be 16.51 million b/d.

Including exports will bring total demand to 17.17 million b/d this year, up 0.6%. This revised forecast is down slightly from OGJ's earlier estimate (OGJ, Jan. 26, p. 41) of a 2% increase in domestic demand for the year to 16.51 million b/d.

The major difference is a 100,000 b/d drop in expected demand for residual fuel oil. Prices have been stronger than expected, making heavy fuel oil less competitive in the electric utility and industrial markets.

Distillate fuel oil demand is also expected to be lower than estimated earlier. Lower natural gas prices have enabled gas to capture more of the home heating market.

Domestic production will be down again in 1987, though higher prices have helped slow the rate of decline. Production of crude and lease condensate for 1987 is expected to be 8.36 million b/d, down 3.7% from 1986 and down 6.8% from 1985. Production during the first half of 1987 was about 8.39 million b/d, helped by a surge in Alaskan production to 1.94 million b/d, but output is expected to fall to 8.33 million b/d in the second half.

The gap between growing demand and falling domestic production must be filled by imports. During the first half of 1987, a reduction in inventories slowed the increase in imports; total imports were an estimated 5.87 million b/d.

This is expected to jump to 6.89 million b/d during the second half of the year, bringing the year's average to 6.38 million b/d, up 3.3% from 1986.

Imports have increased by 1.431 million b/d over the past two years. In 1985, imports represented 31.5% of domestic demand; the share will be 39% in 1987.

During the 1981-1985 period, U.S. dependence on imports was partially masked by the drawdown of inventories. Industry inventories were reduced in 4 out of 5 years and were 20% lower by year end 1985. They were boosted last year as low prices and higher demand encouraged refiners to boost stocks. But they are being reduced again this year.

However, refiners cannot cut much deeper into stocks without risking a supply disruption. So stocks will move up in the second half but will finish the year 2.9% below 1986.

Refining profitability, which improved in 1986, is expected to slip a bit this year. Even though increased demand will boost refining runs by 0.1% to 12.73 million b/d, average capacity is projected to increase to 15.62 million b/d for 1987, up 0.8% from 15.494 million b/d in 1986.

The result will be a slight decrease in average capacity utilization rate to 82.3% in 1987 from 82.8% last year.

Price outlook. The key to events in the industry during the first half was the ability of OPEC to stay close to its production quota.

After last year's price free fall, OPEC's quota agreement in December resulted in a rebound in prices in late 1986. And prices have risen slowly during the first half of 1987.

At OPEC's most recent meeting late last month, the quota system remained intact. Though the official production level was increased to 16.6 million b/d, the new quota is only slightly above actual production.

The average price of internationally traded export crudes fell to a low of $9.35/bbl the first week of August 1986, but since January held fairly stable around the $17/bbl range. Prices moved up following the conclusion of the June OPEC meeting.

The average wellhead price of U.S. crude fell from $24.51/bbl in December 1985 to $9.39/bbl in July 1986, a drop of $15.12/bbl, or 61.7%. The current average wellhead price of about $15/bbl, restores only about 37% of the decline.

The average pump price of all types of motor gasoline in the U.S. fell to 93.1¢/gal in 1986. Adjusted for inflation that was the lowest price in history. The resulting boost in demand for motor gasoline that occurred in 1986 has continued this year.

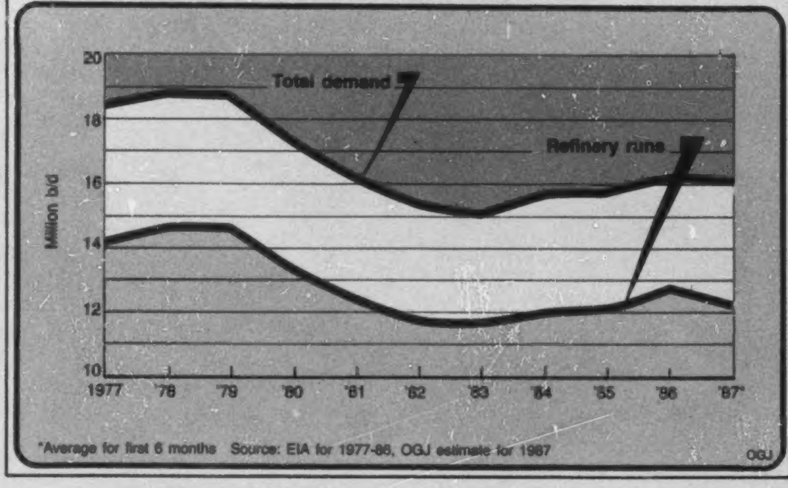
The average pump price for 1987 is forecast at 99.5¢/gal, up 6.9%.

The increased pump price reflects increased taxes as well as product costs. The increase to the refiner will be less, as a number of states have boosted gasoline taxes.

Residential heating oil prices fell to 84.4¢/gal last year, but are also expected to recover in 1987 to about 90.5¢/gal.

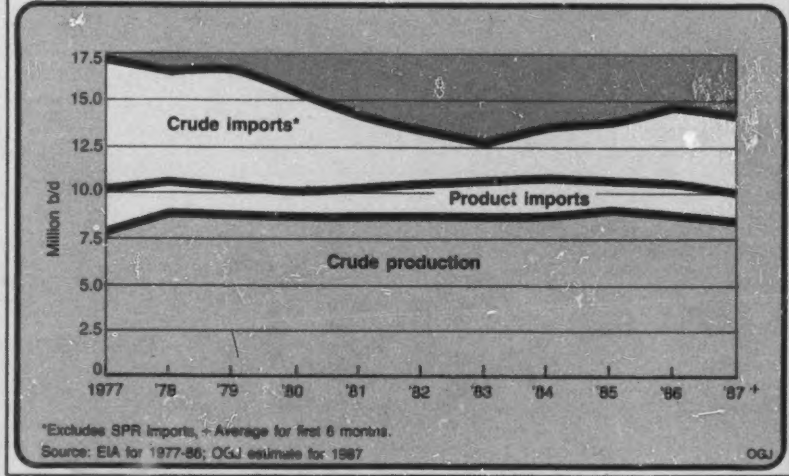
Competition in the fuel market led to a sharp drop in the wellhead price of natural gas. Natural gas prices peaked in 1984 at $2.66/Mcf, then fell to $2.51/Mcf in 1985 and $1.87/Mcf in 1986.

Oil demand, refinery runs level off



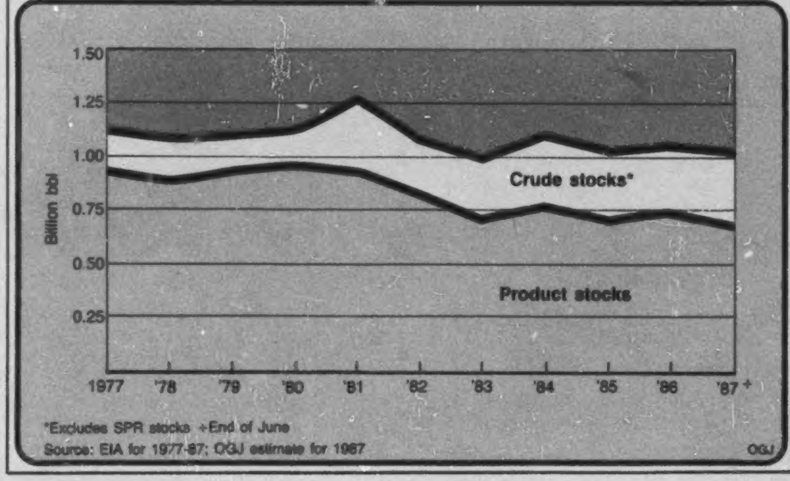
*Average for first 6 months Source: EIA for 1977-86, OGJ estimate for 1987

Crude production slips further



*Excludes SPR imports, + Average for first 6 months.
Source: EIA for 1977-86; OGJ estimate for 1987

Stocks drop



*Excludes SPR stocks +End of June
Source: EIA for 1977-87; OGJ estimate for 1987

1987 U.S. demand up, crude supply down

	First half 1987		Third quarter 1987		Fourth quarter 1987		Year 1987	
	Volume, 1,000 b/d	Change from 1986, %	Volume, 1,000 b/d	Change from 1986, %	Volume, 1,000 b/d	Change from 1986, %	[redacted]	[redacted]
Demand								
Motor gasoline	7,010	+ 1.7	7,270	+ 0.3	7,070	− 0.3	[redacted]	[redacted]
Dist. 1-4	5,855	+ 1.8	6,050	+ 0.1	5,900	− 0.2	[redacted]	[redacted]
Dist. 5	1,155	+ 1.4	1,220	+ 1.5	1,170	− 1.0	[redacted]	[redacted]
Naphtha jet fuel	205	+ 4.4	215	+ 3.7	215	+ 3.2	[redacted]	[redacted]
Dist. 1-4	145	+ 6.7	155	+ 7.9	155	+ 4.0	[redacted]	[redacted]
Dist. 5	60	− 0.8	60	− 5.8	60	+ 1.1	[redacted]	[redacted]
Kerosine jet fuel	1,135	+ 6.2	1,170	+ 3.9	1,200	+ 3.7	[redacted]	[redacted]
Dist. 1-4	815	+ 4.3	845	+ 5.2	865	+ 1.4	[redacted]	[redacted]
Dist. 5	320	+11.4	325	+ 0.8	335	+10.0	[redacted]	[redacted]
Distillate fuel oil	2,980	− 1.3	2,640	+ 2.2	3,160	+ 4.0	[redacted]	[redacted]
Dist. 1-4	2,585	− 1.8	2,230	+ 2.0	2,760	+ 3.9	[redacted]	[redacted]
Dist. 5	395	+ 1.4	410	+ 3.0	400	+ 4.3	[redacted]	[redacted]
Residual fuel oil	1,290	− 8.3	1,250	−12.6	1,290	− 9.7	[redacted]	[redacted]
Dist. 1-4	1,020	− 8.2	980	−14.0	1,020	−12.8	[redacted]	[redacted]
Dist. 5	270	− 8.8	270	− 6.9	270	+ 4.1	[redacted]	[redacted]
LPG and ethane	1,580	+ 8.8	1,380	+ 3.4	1,780	− 1.9	[redacted]	[redacted]
Dist. 1-4	1,520	+ 8.8	1,335	+ 3.8	1,725	− 1.6	[redacted]	[redacted]
Dist. 5	60	+ 7.1	45	− 8.2	55	− 9.8	[redacted]	[redacted]
Other products	2,030	− 1.1	2,310	− 1.7	2,070	+ 8.3	[redacted]	[redacted]
Dist. 1-4	1,710	− 1.0	1,975	− 1.9	1,745	+ 6.9	[redacted]	[redacted]
Dist. 5	320	− 1.9	335	− 0.6	325	+15.9	[redacted]	[redacted]
TOTAL DOMESTIC DEMAND	**16,230**	**+ 0.9**	**16,235**	**− 0.3**	**16,785**	**+ 0.8**	[redacted]	[redacted]
Dist. 1-4	13,650	+ 0.9	13,570	− 0.3	14,170	+ 0.3	[redacted]	[redacted]
Dist. 5	2,580	+ 1.0	2,665	+ 0.1	2,615	+ 3.4	[redacted]	[redacted]
EXPORTS	**840**	**+ 7.6**	**740**	**− 2.1**	**780**	**− 5.3**	[redacted]	[redacted]
Dist. 1-4	400	+ 6.8	345	− 4.3	375	− 3.8	[redacted]	[redacted]
Dist. 5	440	+ 8.4	395	—	405	− 6.7	[redacted]	[redacted]
TOTAL DEMAND	**17,070**	**+ 1.2**	**16,975**	**− 0.3**	**17,565**	**+ 0.5**	[redacted]	[redacted]
Dist. 1-4	14,050	+ 1.0	13,915	− 0.4	14,545	+ 0.2	[redacted]	[redacted]
Dist. 5	3,020	+ 2.0	3,060	+ 0.1	3,020	+ 1.9	[redacted]	[redacted]
Supply								
DOMESTIC PRODUCTION							[redacted]	[redacted]
Crude & lease condensate	8,390	− 6.2	8,360	− 1.1	8,300	− 1.1	[redacted]	[redacted]
Dist. 1-4	5,355	− 9.2	5,330	− 5.8	5,300	− 5.1	[redacted]	[redacted]
Dist. 5	3,035	− 0.3	3,030	+ 3.7	3,000	+ 1.7	[redacted]	[redacted]
NGL and other hydrocarbons	1,620	− 1.9	1,550	+ 1.3	1,570	− 2.2	[redacted]	[redacted]
Dist. 1-4	1,565	− 2.1	1,495	+ 1.0	1,515	− 2.4	[redacted]	[redacted]
Dist. 5	55	+ 6.1	55	+ 9.3	55	+ 1.9	[redacted]	[redacted]
IMPORTS							[redacted]	[redacted]
Crude	4,040	+11.7	4,900	+ 1.6	4,940	+11.3	[redacted]	[redacted]
Dist. 1-4	3,840	+11.8	4,700	+ 1.9	4,740	+11.1	[redacted]	[redacted]
Dist. 5	200	+10.3	200	− 5.2	200	+14.9	[redacted]	[redacted]
Products & unfinished oils	1,830	− 5.6	1,960	−10.6	1,980	− 5.2	[redacted]	[redacted]
Dist. 1-4	1,710	− 5.4	1,840	−10.6	1,860	− 5.6	[redacted]	[redacted]
Dist. 5	120	− 9.1	120	− 9.8	120	+ 1.4	[redacted]	[redacted]
Total imports	5,870	+ 5.7	6,860	− 2.2	6,920	+ 6.0	[redacted]	[redacted]
Dist. 1-4	5,550	+ 5.9	6,540	− 2.0	6,600	+ 5.8	[redacted]	[redacted]
Dist. 5	320	+ 2.1	320	− 7.0	320	+ 9.5	[redacted]	[redacted]
OTHER SUPPLY							[redacted]	[redacted]
Processing gain, loss, etc.	860	+ 8.6	680	−15.4	620	− 1.4	[redacted]	[redacted]
Dist. 1-4	695	+ 9.6	560	−13.3	510	−10.1	[redacted]	[redacted]
Dist. 5	165	+ 4.7	120	−23.7	110	+78.4	[redacted]	[redacted]
TOTAL NEW SUPPLY	**16,740**	**− 1.2**	**17,450**	**− 2.0**	**17,410**	**+ 1.5**	[redacted]	[redacted]
Dist. 1-4	13,165	− 1.6	13,925	− 2.8	13,925	+ 0.9	[redacted]	[redacted]
Dist. 5	3,575	+ 0.2	3,525	+ 1.5	3,485	+ 3.8	[redacted]	[redacted]
STOCK CHANGE	**(330)**	—	**475**	—	**(155)**	—	[redacted]	[redacted]
Dist. 1-4	(885)	—	10	—	(620)	—	[redacted]	[redacted]
Dist. 5	555	—	465	—	465	—	[redacted]	[redacted]
CRUDE RUNS TO STILLS	**12,445**	**− 0.4**	**13,090**	**− 0.1**	**12,940**	**+ 1.5**	[redacted]	[redacted]
TOTAL INPUT TO STILLS	**12,555**	**− 7.8**	**13,220**	**− 7.8**	**13,070**	**− 6.9**	[redacted]	[redacted]
TOTAL REFINERY CAPACITY	**15,615**	**+ 0.9**	**15,625**	**+ 1.2**	**15,625**	**+ 1.2**	[redacted]	[redacted]
REFINERY UTILIZATION (%)	**80.4**	**− 1.3**	**84.7**	**− 0.9**	**83.6**	**+ 0.4**	[redacted]	[redacted]
TOTAL INDUSTRY STOCKS*	**1,020**	**+ 0.7**	**1,064**	**− 2.0**	**1,050**	**− 4.2**	[redacted]	[redacted]
Refined products*	695	+ 2.2	734	− 1.9	720	− 5.0	[redacted]	[redacted]
Crude*	325	− 2.5	330	− 2.3	330	− 2.4	[redacted]	[redacted]
Govt. SPR crude stocks*	527	+ 5.9	534	+ 5.8	540	+ 6.0	[redacted]	[redacted]

* Million bbl at end of period.

The price has continued to fall this year as natural gas sellers try to recapture the market lost to other fuels. Prices are expected to average $1.60/Mcf in 1987, down another 14.4% compared to last year.

Energy demand. U.S. economic growth rate in 1987 is expected to change little from 1986. Real gross national product (GNP) is forecast to gain 2.56%, compared to 2.50% in 1986.

However, due to growth in energy-intensive industries, energy consumption is expected to increase 1.1% to 74.72 quadrillion BTU. Energy consumption fell 0.1% last year.

Conservation has greatly reduced the impact of economic growth on energy demand. Before the sharp rise in energy prices in the early 1970's, a percentage point increase in economic growth led to a similar increase in energy consumption. But between 1970 and 1986, a 1% increase in GNP brought only a 0.2% increase in energy consumption.

Energy consumption per unit of GNP fell continuously from 1970-1986, dropping 27.7%; this improvement will continue in 1987.

Since oil energy demand is expected to increase only 0.5% in 1987 compared to the 1.1% increase in total energy demand, oil's share of total demand will drop to 43% from 43.2% in 1986. Natural gas will also lose market share, falling to 22.2% from 22.4% in 1986. Coal's share will fall to 23.3% from 23.4%. Nuclear energy will increase its share to 6.4% from 6% in 1986, and hydroelectric power will account for 5.1% of the market, up from 5% in 1986.

The sharp drop in gas prices and the increase in oil prices is expected to improve the competitive position of natural gas in 1987. But the immediate improvement in demand will be only marginal, up 1% to 16.17 tcf.

Domestic marketed production will increase only 0.2% to 16.85 tcf. Imports will increase 0.8% to 760 bcf, all from Canada.

Product demand trends. Sharply lower prices gave overall petroleum product demand a sharp 3.5% boost in 1986. Higher prices this year will dampen the rate of growth, but increased economic activity will result in product demand rising 0.5% to 16.37 million b/d.

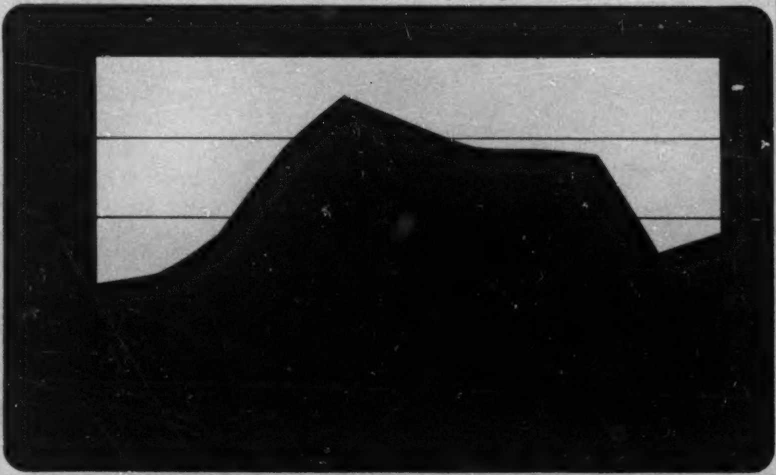
First half domestic demand was 16.23 million b/d, up 0.9% from the first half a year ago. The largest increases were for motor gasoline, jet fuel, and liquified petroleum gases. Gains for these products were partially offset by a sharp drop in resid demand.

Domestic demand peaked in 1978 at 18.847 million b/d, and then fell sharply to 15.231 million b/d in 1983, as a result of the sharp rise in prices. Demand has been slowly increasing since 1983 and this year will be up 1.139 million b/d, or 7.5%, from the 1983 low.

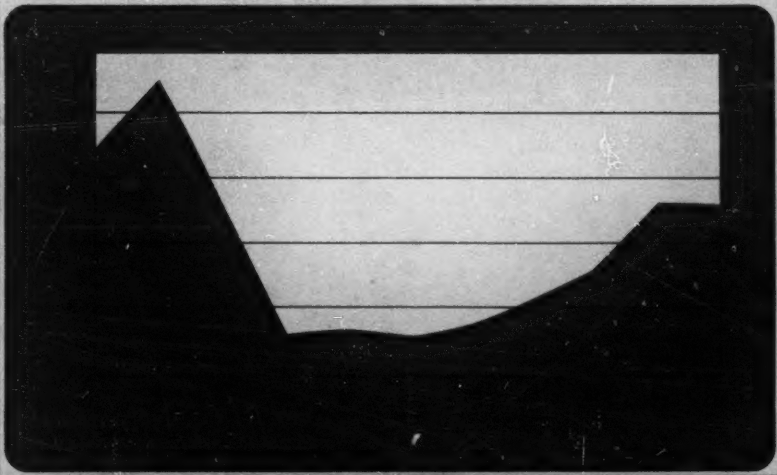
For the year, increases are expected in all major product categories except residual fuel oil.

An increase in resid demand—the first since 1977—was a major reason

Refiner's crude costs start up again



Gasoline demand declines slightly



U.S. energy demand

Energy source	Trillion BTU [illegible]	Trillion BTU 1986	Trillion BTU 1985	% change [illegible]	% change 1986/85	% of total market [illegible]	% of total market 1986	% of total market 1985
Oil	[illegible]	31,887	30,922	[illegible]	+ 3.1	[illegible]	43.2	41.8
Gas	[illegible]	16,531	17,851	[illegible]	− 7.4	[illegible]	22.4	24.2
Coal	[illegible]	17,271	17,479	[illegible]	− 1.2	[illegible]	23.4	23.6
Nuclear	[illegible]	4,475	4,147	[illegible]	+ 7.9	[illegible]	6.0	5.6
Hydro. & geothermal	[illegible]	3,709	3,563	[illegible]	+ 4.1	[illegible]	5.0	4.8
Total	[illegible]	**73,873**	**73,962**	[illegible]	**− 0.1**	[illegible]	**100.0**	**100.0**

Source: 1985 & 1986, EIA; 1987, OGJ estimates.

First quarter worldwide production

Country	1987	1986 ,000 b/d	Change	Change, %
Non-OPEC				
United States	[illegible]	9,099	−741	− 8.1
Canada	[illegible]	1,418	+ 57	+ 4.0
Brazil	[illegible]	579	− 11	− 1.9
Mexico	[illegible]	2,290	+234	+10.2
Other Non-OPEC	[illegible]	1,066	+ 77	+ 7.2
Western Hemisphere	[illegible]	14,451	−384	− 2.7
Norway	[illegible]	856	+146	+17.1
United Kingdom	[illegible]	2,711	−160	− 5.9
Other	[illegible]	464	+ 27	+ 5.8
Western Europe	[illegible]	4,031	+ 13	+ 0.3
Egypt	[illegible]	813	+ 65	+ 8.0
Other Non-OPEC	[illegible]	743	− 7	− 0.9
Africa	[illegible]	1,556	+ 58	+ 3.7
Oman	[illegible]	507	+ 23	+ 4.5
Other Non-OPEC	[illegible]	230	+ 33	+14.3
Middle East	[illegible]	737	+ 56	+ 7.6
Australia	[illegible]	562	+ 7	+ 1.2
India	[illegible]	629	− 18	− 2.9
Malaysia	[illegible]	484	− 22	− 4.5
Other Non-OPEC	[illegible]	323	− 17	− 5.3
Asia-Pacific	[illegible]	1,998	− 50	− 2.5
Total Non-OPEC	[illegible]	22,773	−307	− 1.3
OPEC	[illegible]	17,291	−1,545	− 8.9
Total Non Communist	[illegible]	40,064	−1,852	− 4.6
Communist				
China	[illegible]	2,496	+194	+ 7.8
USSR	[illegible]	12,086	+324	+ 2.7
Other	[illegible]	453	− 31	− 6.8
Total Communist	[illegible]	15,035	+487	+ 3.2
Total World	[illegible]	**55,099**	**−1,365**	**− 2.5**

First half crude and products stocks*

	†1987, 1,000 bbl	'87/'86 %	†1986, 1,000 bbl	Change '86/'85, %	†1985, 1,000 bbl
Motor gasoline	[illegible]	[illegible]	233,377	+ 6.9	218,344
Naphtha jet fuel	7,000	+ 6.3	6,581	+ 5.7	6,227
Kerosine jet fuel	[illegible]	− 1.5	39,603	+ 8.4	36,537
Distillate fuel oil	100,500	− 7.7	108,825	− 0.8	109,688
Residual fuel oil	39,500	− 8.1	42,983	+ 8.4	39,622
Unfinished oils	104,000	− 6.4	111,087	− 2.4	113,762
Other§	172,000	+ 0.3	171,413	+ 3.1	166,241
Total product stocks	[illegible]	− 2.6	**713,869**	**+ 3.4**	**690,421**
Crude stocks	325,000	− 0.1	325,453	− 5.4	344,058
Total	[illegible]	− 1.9	**1,039,322**	**+ 0.4**	**1,034,479**

*Excludes Strategic Petroleum Reserve. †At end of June. §Includes natural gas liquids and kerosine.
Source: 1985-86, EIA; 1987, OGJ estimate.

for the sharp jump in product demand in 1986. Resid demand last year increased 216,000 b/d to 1.418 million b/d. Demand peaked in 1977 at 3.071 million b/d, then dropped 60.9% to 1.202 million b/d in 1985.

Last year's reversal was due to the sharp drop in prices that allowed resid to recapture some of its market.

For the first time last year the average cost of resid for steam elective utility plants fell below natural gas for the April-October period. Prices moved back up toward the end of the year and resid lost this absolute price advantage. The spot market price of resid hit a low of $9.40/bbl in July 1986; last month it was back up to $18.90/bbl.

As a result resid demand is expected to fall again in 1987 to 1.28 million b/d, losing much of last year's increase.

Demand for jet fuel is expected to increase substantially again in 1987, increasing 4.8% to 1.37 million b/d. Most of the increase will be in demand for kerosine jet fuel for commercial aircraft, which will rise 5% to 1.16 million b/d.

For the first 5 months of 1987 the available seat miles were up 10.1% for domestic service and 7.2% for international service. For the first 5 months revenue ton miles for air freight service were up 6.6% in the U.S., and up 8.5% for international service.

As was the case last year, airline competition and increased economic activity should help keep demand for jet fuel strong throughout the year.

The sharp drop in motor gasoline prices in 1986 helped boost demand 203,000 b/d to 7.034 million b/d. Adjusted for inflation, the average 1986 price was the lowest on record.

Prices have regained some ground this year, but not enough to bring back the conservation ethic of past years.

OGJ projects total motor gasoline demand at 7.09 million b/d, up another 56,000 b/d. This would be the highest demand since the peak of 7.412 million b/d in 1978, and the third highest year on record.

Demand is constrained by the continuing improvement in the vehicle fleet fuel efficiency. Average miles/gallon has moved up steadily from 13.1 in 1973 to 17.9 in 1985 and an estimated 18.2 in 1986. Fleet average mpg is expected to increase again to 18.6 in 1987.

This improvement in efficiency will be offset by an increase in the average number of miles driven per car and an increase in the size of the fleet. The passenger car fleet will grow to about 135 million in 1987, up 2 million vehicles. Average miles driven per vehicle is expected to reach 10,100 in 1987, the highest since 1972.

OGJ's weekly survey of the pump price of regular unleaded self service gasoline shows an average price at the end of June of 96.1¢/gal, 7.6% higher than a year earlier.

This increase of less than 7¢/gal is not expected to reduce demand.

Demand for distillate is expected to increase only 0.9% in 1987 to 2.94 million b/d. Almost all of the increase will be in demand for diesel fuel for highway trucks. Truck demand will grow 30,000 b/d in 1987, other demand for diesel fuel will increase 5,000 b/d.

This increase in distillate demand will be partly offset by a 9,000 b/d drop in demand for No. 2 fuel oil for home heating, brought on in part by a loss of market to low-priced natural gas. No. 2 heating oil prices are expected to be up 7.2% in 1987 at 90.5c/gal.

Demand for other petroleum products is expected to be up in 1987. LPG and ethane demand will reach 1.58 million b/d, an increase of 68,000 b/d. Demand last year fell 78,000 b/d.

Demand for all other products is expected to move up a slight 14,000 b/d to 2.11 million b/d. Increases are expected in demand for asphalt and petrochemical feedstocks.

Production down. The sharp drop in oil prices in 1986 had a severe impact on U.S. oil production, particularly in the last half of last year. The effect continued throught the first half of 1987. And production will continue to decline the rest of this year, although at a slower rate.

Average annual U.S. production fell 3.2%, or 291,000 b/d, in 1986 to 8.68 million b/d. Production fell from 8.941 million b/d during the first half of the year to 8.419 million b/d in the second half, a drop of 5.8%. Production in the first half of 1987 slid further to 8.39 million b/d, down 6.2% from first half 1986.

Crude and condensate production in the second half is expected to decline to 8.33 million b/d, bringing average output to 8.36 million b/d for the year. That's down 3.7% from 1986.

The decline last year resulted from a sharp drop in drilling and the shutting in of some stripper wells.

Without new production from new wells, output in the lower-48 states was dropping sharply. Lower-48 production fell from 7.146 million b/d in 1985 to 6.813 million b/d in 1986, a drop of 4.7%. Output has fallen further to an estimated 6.45 million b/d for the first half of 1987, an 8.6% drop

U.S. crude and product prices

Year	[redacted]	[redacted]	Retail motor gasoline all types ¢/gal	Residential heating oil, ¢/gal	Average wellhead price natural gas, $/Mcf
1976	[redacted]	[redacted]	59.5	40.6	0.58
1977	[redacted]	[redacted]	63.1	46.0	0.79
1978	[redacted]	[redacted]	65.2	49.0	0.91
1979	[redacted]	[redacted]	88.2	70.4	1.18
1980	[redacted]	[redacted]	122.1	97.4	1.59
1981	[redacted]	[redacted]	135.3	119.4	1.98
1982	[redacted]	[redacted]	128.1	116.0	2.46
1983	[redacted]	[redacted]	122.5	107.8	2.59
1984	[redacted]	[redacted]	119.8	109.1	2.66
1985	[redacted]	[redacted]	119.6	105.3	2.51
1986	[redacted]	[redacted]	93.1	84.4	1.87
1987	[redacted]	[redacted]	99.5	90.5	1.60

Source: 1976-1986 DOE; 1987 OGJ estimate.

U.S. natural gas supply and demand

	1987	1986	1985	1984	Change 1986/1985, %	[redacted]
	Billion cu ft					
Production						
Texas	6,120	6,092	6,053	6,185	+ 0.6	[redacted]
Louisiana	4,850	4,889	5,014	5,825	− 2.5	[redacted]
Other states	5,880	5,828	6,131	6,220	− 4.9	[redacted]
Total production	**16,850**	**16,809**	**17,198**	**18,230**	**− 2.3**	[redacted]
Imports						
Canada	760	752	925	755	−18.7	[redacted]
Mexico	0	0	0	52	—	[redacted]
LNG*	0	2	24	36	−91.7	[redacted]
Total imports	**760**	**754**	**949**	**843**	**−20.5**	[redacted]
Supplemental gas	140	142	126	110	+12.7	[redacted]
Losses, etc.†	−1,525	−1,526	−1,169	−980	+30.5	[redacted]
Total supply	**16,225**	**16,179**	**17,104**	**18,203**	**− 5.4**	[redacted]
Exports	55	55	57	55	− 4.5	[redacted]
Stock change	—	+121	−234	+197	—	[redacted]
Total consumption	**16,170**	**16,003**	**17,281**	**17,951**	**− 7.4**	[redacted]

* LNG imports from Algeria in 1984 and 1985, from Indonesia in 1986.
† Extraction losses, and unaccounted for gas.
Source: 1984, 1985 and 1986, DOE; 1987 OGJ estimates.

U.S. refinery utilization

	Crude runs	Input to distillation units	Operable capacity	[redacted]
	(1,000 b/d)			
1978	14,739	15,071	17,144	[redacted]
1979	14,646	14,950	17,660	[redacted]
1980	13,453	13,788	18,209	[redacted]
1981	12,471	12,751	18,603	[redacted]
1982	11,766	12,176	17,445	[redacted]
1983	11,345	11,645	16,831	[redacted]
1984	12,044	12,335	16,034	[redacted]
1985	12,002	12,161	15,671	[redacted]
1986	12,716	12,817	15,467	[redacted]
1987*	12,730	12,850	15,620	[redacted]
1978-87 change				
(Volume)	−2,009	−2,221	−1,524	[redacted]
(Percent)	−13.6	−14.7	− 8.89	[redacted]
1986-87 change				
(Volume)	+14	+33	+153	[redacted]
(Percent)	+ 0.1	+ 0.3	+ 1.0	[redacted]

*OGJ estimate.

OPEC production

Country	First quarter 1987	First quarter 1986	[illegible]	[illegible]	OPEC quota Jan. 1987, 1,000 b/d
	—— 1,000 b/d ——				
Algeria	623	584	[illegible]	[illegible]	635
Ecuador	199	303	[illegible]	[illegible]	210
Gabon	152	160	[illegible]	[illegible]	152
Indonesia	1,110	1,235	[illegible]	[illegible]	1,133
Iran	2,110	1,959	[illegible]	[illegible]	2,255
Iraq	1,661	1,746	[illegible]	[illegible]	1,466
Kuwait	950	1,169	[illegible]	[illegible]	948
Libya	934	984	[illegible]	[illegible]	948
Neutral Zone*	406	264	[illegible]	[illegible]	—
Nigeria	1,216	1,400	[illegible]	[illegible]	1,238
Qatar	199	334	[illegible]	[illegible]	285
Saudi Arabia	3,559	4,228	[illegible]	[illegible]	4,133
United Arab Emirates	1,110	1,366	[illegible]	[illegible]	902
Venezuela	1,517	1,559	[illegible]	[illegible]	1,495
Total OPEC	**15,746**	**17,291**	[illegible]	[illegible]	**15,800**

*Shared by Kuwait and Saudi Arabia.

from first half 1986.

However, the rate of decline for both total U.S. production and for the lower 48 has slowed. Higher oil prices have boosted drilling activity modestly and there is some evidence that temporarily shut-in production is coming back on stream.

Lower-48 output is expected to be sustained at 6.44 million b/d for the year. California output is expected to move up about 20,000 b/d in the second half and offset most of the reduction elsewhere. The lower-48 states will average 6.43 million b/d for the second half.

A surge in Alaskan production has been the main reason first half total U.S. output is not lower. Alaskan production has averaged an estimated 1.94 million b/d during the first half, up 87,000 b/d from the second half of 1986.

Alaskan production is expected to drop to 1.9 million b/d in the second half of 1987, as Prudhoe Bay output is reduced to meet state annual average production restrictions. The reduction will pull U.S. production down to 8.33 million b/d in the second half.

To offset the natural decline rate of the lower-48 would require at least 25-35,000 new oil wells per year; that would take an active rig count of 1,500-2,000 rigs.

Imports, stocks. Increased demand, the continuing drop in domestic production, and the end to the stock drawdown will boost imports sharply in the second half.

Total imports, excluding crude for the Strategic Petroleum Reserve (SPR), were 5.87 million b/d during the first half. This is expected to jump to 6.89 million b/d during the last half of this year, resulting in an average for the year of 6.38 million b/d, up 3.3% from 1986.

Crude imports in the first half were 4.04 million b/d and product imports 1.83 million b/d.

Compared with 1985, total imports will be up 28.9%, or 1.431 million b/d. Total crude and product imports were 31.5% of domestic demand in 1985, 37.9% in 1986, and will be 39% in 1987.

Crude imports, excluding the SPR, are expected to increase to 4.92 million b/d for the second half. For the year crude imports will average 4.48 million b/d, up 8.5% from 1986, and up 45.3% from 1985.

SPR crude stocks increased to 527 million bbl in the first half and are expected to reach 540 million bbl by year end, up 5.5% from year end 1986. This is an additional 76,700 b/d in crude oil imports for 1987.

Product imports will increase from the first half average of 1.83 million b/d to 1.97 million b/d in the second half. For the year, the average will be 1.9 million b/d, down 145,000 b/d, or 7.1%, from 1986.

Part of the decline will be due to reduced resid imports resulting from the drop in resid demand.

For the first quarter of 1987 the leading source of crude imports was Mexico at 626,000 b/d; Saudi Arabia followed at 623,000 b/d. Imports from Saudi Arabia had fallen to only

World crude prices rebound

Country	Type of crude and API gravity	Current price,* $/bbl	[illegible]	In effect Jan. 1, 1987, $/bbl	[illegible]	In effect Jan. 1, 1986, $/bbl	In effect Jan. 1, 1985, $/bbl	In effect Jan. 1, 1984, $/bbl	In effect Jan. 1, 1983, $/bbl
OPEC									
Saudi Arabia	Arabian Light 34°	17.52	[illegible]	16.15	[illegible]	28.00	29.00	29.00	34.00
Abu Dhabi	Murban 39°	17.92	[illegible]	15.55	[illegible]	28.15	29.31	29.56	34.56
Algeria	Saharan 44°	18.87	[illegible]	17.30	[illegible]	29.50	30.50	30.50	35.50
Nigeria	Bonny Light 37°	18.92	[illegible]	17.13	[illegible]	28.65	28.00	30.00	35.50
Libya	Es Sider 37°	18.52	[illegible]	16.95	[illegible]	30.15	30.15	30.15	35.10
Indonesia	Minas 34°	17.56	[illegible]	16.28	[illegible]	28.53	29.53	29.53	34.53
Venezuela	Tia Juana 31°	17.62	[illegible]	15.10	[illegible]	28.05	29.84	29.84	35.00
Total OPEC		**17.41**	[illegible]	**16.10**	[illegible]	**27.81**	**28.43**	**28.59**	**33.54**
OTHER									
U.K.	Brent blend 38°	18.70	[illegible]	18.25	[illegible]	26.00	28.65	30.00	33.50
Norway	Ekofisk 42°	18.70	[illegible]	16.86	[illegible]	26.61	28.50	30.25	34.25
Mexico	Isthmus 33°	19.26	[illegible]	17.00	[illegible]	26.21	29.00	29.00	32.50
U.S.S.R.	Export blend 32°	18.35	[illegible]	18.30	[illegible]	28.15	28.00	28.60	31.20
Total World		**17.63**	[illegible]	**16.24**	[illegible]	**27.10**	**28.33**	**28.61**	**33.00**
U.S.†		15.00	[illegible]	13.89	[illegible]	23.96	24.28	25.94	27.22

* Represents estimated contract prices based on government-stated prices, netback deals and spot market quotations. Prices from 1983 to Jan. 1, 1986, were official prices. † U.S. average crude oil wellhead price.

Source: Energy Information Administration

U.S. imports

Sources of crude imports*

Country	[illegible]	[illegible]	[illegible]	Annual average 1986, 1,000 b/d	Change 1986/1985, %	Annual average 1985, 1,000 b/d
Algeria	[illegible]	[illegible]	[illegible]	84	+ 7.7	78
Indonesia	[illegible]	[illegible]	[illegible]	297	+ 1.7	292
Nigeria	[illegible]	[illegible]	[illegible]	437	+ 56.1	280
Saudi Arabia	[illegible]	[illegible]	[illegible]	618	+371.8	131
Venezuela	[illegible]	[illegible]	[illegible]	416	+ 35.9	306
Other OPEC	[illegible]	[illegible]	[illegible]	249	+ 10.7	225
Total OPEC	[illegible]	[illegible]	[illegible]	**2,101**	**+ 60.1**	**1,312**
Angola	[illegible]	[illegible]	[illegible]	102	− 1.0	103
Canada	[illegible]	[illegible]	[illegible]	570	+ 21.8	468
Colombia	[illegible]	[illegible]	[illegible]	0	—	0
Mexico	[illegible]	[illegible]	[illegible]	620	− 13.3	715
Trinidad & Tobago	[illegible]	[illegible]	[illegible]	93	− 5.1	98
United Kingdom	[illegible]	[illegible]	[illegible]	317	+ 14.0	278
Other Non-OPEC	[illegible]	[illegible]	27.7	375	+ 65.9	226
Total imports	[illegible]	[illegible]	[illegible]	**4,178**	**+ 30.6**	**3,200**

Sources of refined product imports

Country	[illegible]	[illegible]	[illegible]	Annual average 1986, 1,000 b/d	Change 1986/1985, %	Annual average 1985, 1,000 b/d
Algeria	[illegible]	[illegible]	[illegible]	193	+ 87.4	103
Saudi Arabia	[illegible]	[illegible]	[illegible]	67	+ 86.1	36
Venezuela	[illegible]	[illegible]	[illegible]	377	+ 26.1	299
Other OPEC	12.7	[illegible]	[illegible]	86	+ 14.7	75
Total OPEC	[illegible]	[illegible]	[illegible]	**723**	**+ 40.9**	**513**
Brazil	[illegible]	[illegible]	[illegible]	50	− 18.0	61
Canada	[illegible]	[illegible]	[illegible]	236	− 21.9	302
Mexico	[illegible]	[illegible]	[illegible]	78	− 22.8	101
Netherlands	[illegible]	[illegible]	5.6	54	− 6.9	58
Romania	[illegible]	[illegible]	24.5	53	+ 6.0	50
Virgin Islands	[illegible]	[illegible]	19.3	243	− 1.7	247
Other Non-OPEC	[illegible]	[illegible]	8.1	608	+ 13.9	534
Total imports	100.0	[illegible]	[illegible]	**2,045**	**+ 9.6**	**1,866**

*Includes imports for the Strategic Petroleum Reserve.
Source: Energy Information Administration.

131,000 b/d in 1985, but increased import requirements and netback deals boosted this back to 618,000 b/d in 1986.

Total imports from OPEC averaged 1.984 million b/d for the first quarter, 49.5% of the total. This was down slightly from the 2.101 million b/d average for 1986.

But import volumes were low in the first quarter and imports from OPEC are expected to increase substantially throughout the year.

The leading sources of product imports in the first quarter were Venezuela, 309,000 b/d; Virgin Islands, 290,000 b/d; Canada, 209,000 b/d; and Algeria, 145,000 b/d. Total product imports from OPEC averaged 572,000 b/d during the quarter, and for all of 1986 averaged 723,000 b/d, 35.4% of the total.

Inventories of crude oil and products contributed an estimated 330,000 b/d to supply during the first half of 1987. Product stocks in particular were drawn down to a level thought more consistent with expected product demand. Product stocks were reduced 55 million bbl from year end 1986; crude stocks were reduced an additional 6 million bbl.

The use of inventories to help meet demand in the first half reduced import requirements. But stocks are expected to increase in the second half of 1987, boosting imports. Product stocks are expected to gain 25 million bbl to 720 million bbl at year end. Crude stocks will gain 5 million bbl.

This would bring stocks at year end more in line with expected demand, but to add 30 million bbl to inventory will increase demand by about 163,000 b/d.

Total stocks of 1.02 million b/d at mid-1987 represent only 61.8 days of supply, low by historical standards.

From 1960-68, total year end stocks ranged from 72.8 to 82.7 days' supply. Stocks dropped to 57.8 days' supply in 1972, then were as high as 78.1 days' supply in 1981.

In recent years, however, refiners have been operating with lower stock levels to cut costs. Excess refining capacity gave refiners more flexibility to adjust output to demand. As a result, refiners have been holding relatively higher crude stocks and have cut product stocks to a minimum.

World production. The OPEC decision in December 1986 to limit production in order to increase and stabilize prices—and last month's agreement to continue limiting output at only slightly higher levels—has been successful so far.

But it has altered the pattern of worldwide production.

OPEC production for the first quarter of 1987 averaged 15.746 million b/d, down 8.9% from the 17.291 million b/d in the same period a year ago, and down 12.8% from the OPEC annual average of 18.057 million b/d for all of 1986.

This reduced world supply by about 2.311 million b/d.

The OPEC quota for the first quarter of 1987 was 15.8 million b/d. OPEC stayed within the quota primarily due to the efforts of Saudi Arabia. Saudi Arabia again acted as swing producer, reducing production to 3.559 million b/d in the first quarter. This was down 1.278 million b/d, or 26.4%, from the average of 4.837 million b/d for all of 1986.

Saudi Arabia was also 574,000 b/d below its quota, although this was offset by 200,000 from the Neutral Zone, which is not included in the quota.

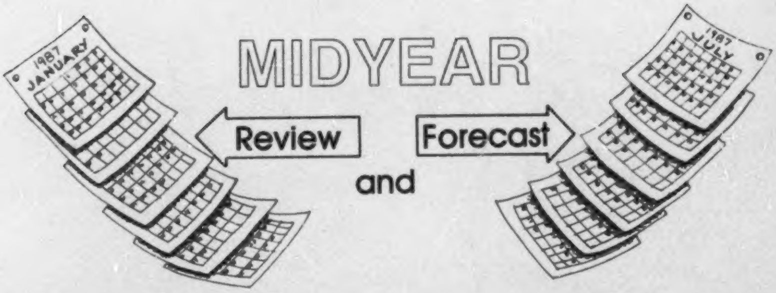
Iran boosted production to 2.11 million b/d in the first quarter of 1987, up from 1.848 million b/d in 1986. But this output was still below their quota of 2.255 million b/d. Iran's production level has been hampered by the war with Iraq. Iraq's output was 1.661 million b/d, down only slightly from 1.69 million b/d in 1986.

Iraq has never agreed to its assigned quota of 1.466 million b/d.

Mainly as a result of the OPEC cuts, total non-Communist output in the first quarter dipped to 38.212 million b/d, down 5.5% from the 1986 average of 40.454 million b/d. Non-Communist output outside of OPEC was 22.466 million b/d, slightly below the same period of 1986 but above the 22.397 million b/d average for all of 1986.

Substantial increases in Mexico, Colombia, Norway, and Egypt helped offset the decline in the U.S. Mexico's production increased to 2.524 million b/d in the first quarter, up 96,000 b/d from the 1986 average.

OPEC's share of total non-Communist output fell to 41.2% in first quarter 1987 from the 44.6% share in 1986. ▪



1987 drilling to be still lower, but majors will lead second-half recovery from slump

John C. McCaslin
Exploration Editor

Major oil companies will lead the way out of the U.S. drilling slump in the second half of 1987.

Responding to higher prices and cash flow, the 17 largest American companies have raised drilling programs 10.6% over January levels that were based on $15 oil.

As a result, the majors now plan to drill 7,143 wells this year compared to 6,460 projected in January and 6,272 completed in 1986, according to the annual midyear survey of Oil & Gas Journal.

The majors say they will drill 4,181 wells in the second half, a 41% increase over the 2,962 completed during the first 6 months. Their plans are based on a stable oil price of $18-20/bbl for the rest of the year.

Independent operators, still saddled with debt and seeking new sources of capital under a tougher tax law, aren't in a position to respond as rapidly as the larger companies. But they, too, will step up the pace, drilling an estimated 15,947 wells in the second half, a 10% increase over the 14,418 drilled by this group in the first half.

The second half recovery still won't prevent a full year decline in completions to the lowest levels since 1974. The 1987 rig count will be the lowest on record.

Here are the highlights of the Journal's revised forecast for U.S. drilling for 1987 and a review of the first half·

•**Drilling expenditures**—$10.985 billion, down 6.9% from the $11.797 spent last year. This assumes average prices of $14.85/bbl for oil, compared to $12.66 last year, and $1.60 for gas, compared to $1.87 in 1986, plus a 2.1% decline in costs per well to $292,870, and a record low reinvestment ratio of 15.2% of wellhead revenues, less than half the 1981-82 peak.

•**Well completions**—37,508, down 4.9% from 39,423 estimated by the American Petroleum Institute for 1986.

•**Active rigs**—920, down 4.6% from 964 as reported by Baker Hughes last year. This level of drilling requires a gain of 15 rigs per week in the second half, ending the year with 1,234 active rigs.

•**Footage**—176.7 million, 2.5% below the 181.3 million ft estimated by API for 1986 and 57% below the 1981 peak of 406 million.

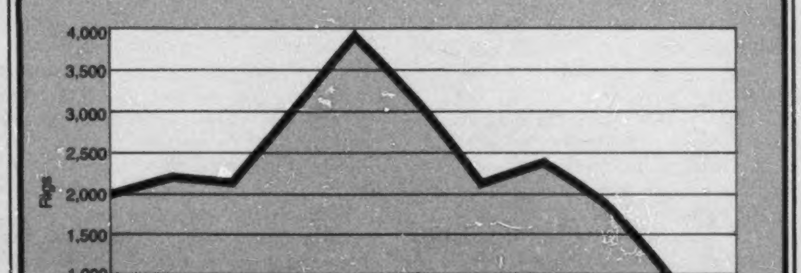
•**Average well depth**—4,711 ft, up 2.4% from the 4,598 ft average last year, reflecting a cutback in shallow drilling in many older areas. Average well depth has been increasing as total completions declined in recent years.

•**Wildcats**—3,957, down a staggering 48% for the year, the most dismal showing for exploratory drilling in modern history. Low and uncertain prices and balance sheet pressures have led operators to shelve higher-risk projects and go mainly for development drilling that promises early production and cash flow.

•**Western Canada**—Total completions of 4,705, down from 6,220 last year, but activity will pick up in the second half, aided by an improved tax regime. The Canadian Association of Oilwell Drilling Contractors now expects active rigs to average 177 for the year compared to 144 in their previous outlook.

Though confidence and capital are slowly beginning to return, operators in the U.S. will take a cautious approach to drilling for the remainder of

U.S. active rotary rigs



Source: 1977-86, Hughes Tool Co.; 1987, OGJ estimate

OGJ's revised drilling forecast for 1987—U.S. and Canada

State district, province	First half estimates				1987 forecast			
	Total comp.	Wildcats	Field wells	Total ft (1,000 ft)	Total comp.	Total wildcats	Field wells	Total ft (1,000)
Alabama	80	25	55	455	170	60	110	967
Alaska	65	10	55	648	169	19	150	1,684
Arizona	1	1	0	3	2	2	0	6
Arkansas	200	35	165	734	390	60	330	1,432
California	929	50	879	2,242	2,668	78	2,590	6,322
Onshore	900	46	854	2,053	2,608	68	2,540	5,930
Offshore	29	4	25	189	60	10	50	392
Colorado	580	75	505	3,436	1,200	130	1,070	7,109
Florida	4	2	2	58	12	3	9	173
Illinois	400	65	335	766	750	110	640	1,437
Indiana	100	35	65	150	170	50	120	255
Iowa	0	0	0	0	1	1	0	15
Kansas	1,250	350	900	4,386	3,150	690	2,460	11,053
Kentucky	400	40	360	620	650	75	575	1,009
Louisiana	894	139	755	6,672	1,935	330	1,605	14,465
North	370	45	325	1,536	800	80	720	3,320
South	354	49	305	3,444	680	85	595	6,615
Offshore	170	45	125	1,692	455	165	290	4,530
Maryland	1	1	0	5	1	1	0	5
Michigan	266	120	146	1,207	600	240	360	2,723
Mississippi	140	40	100	1,173	300	90	210	2,513
Missouri	46	0	46	9	100	0	100	19
Montana	130	40	90	528	250	75	175	1,015
Nebraska	65	45	20	376	160	100	60	925
Nevada	7	5	2	41	15	10	5	89
New Mexico	311	30	281	1,940	620	52	568	3,853
East	231	25	206	1,522	450	40	410	2,964
West	80	5	75	418	170	12	158	889
New York	90	6	84	238	170	10	160	450
North Dakota	58	30	28	571	130	55	75	1,281
Ohio	1,280	15	1,265	4,814	2,850	30	2,820	10,718
Oklahoma	2,175	90	2,085	11,325	4,900	150	4,750	25,514
Oregon	1	1	0	3	13	13	0	36
Pennsylvania	150	4	146	744	250	10	240	1,240
South Dakota	9	4	5	22	18	8	10	45
Tennessee	104	25	79	183	250	49	201	439
Texas	6,775	720	6,055	32,111	13,868	1,238	12,630	70,317
District 1	688	50	638	1,586	1,400	85	1,315	3,227
District 2	250	55	195	1,600	590	100	490	3,774
District 3	377	50	327	2,350	860	80	780	5,360
District 4	430	50	380	3,262	940	90	850	7,131
District 5	150	15	135	938	375	25	350	2,345
District 6	300	45	255	1,913	665	80	585	4,241
District 7-B	1,360	120	1,240	4,325	2,100	200	1,900	6,673
District 7-C	480	65	415	2,428	600	120	480	3,035
District 8	860	45	815	5,186	3,353	80	3,273	20,218
District 8-A	400	55	345	2,332	865	100	765	5,043
District 9	1,190	130	1,060	4,168	1,580	210	1,370	5,535
District 10	200	10	190	1,092	380	18	362	2,074
Offshore	90	30	60	931	160	50	110	1,656
Utah	68	12	56	438	140	30	110	902
Virginia	44	6	38	236	80	10	70	428
Washington	0	0	0	0	1	1	0	15
West Virginia	425	10	415	1,796	825	15	810	3,486
Wyoming	332	90	242	2,257	700	170	530	4,759
Total U.S.	**17,380**	**2,121**	**15,259**	**80,187**	**37,508**	**3,957**	**33,551**	**176,699**
Western Canada	**2,322**	**480**	**1,842**	**10,505**	**4,705**	**930**	**3,775**	**21,217**
Alberta	1,960	400	1,560	9,119	4,000	800	3,200	18,612
Saskatchewan	260	50	210	836	500	75	425	1,608
British Columbia	70	10	60	435	105	20	85	654
Manitoba	12	10	2	34	50	15	35	141
Northwest-Arctic	20	10	10	81	50	20	30	202
Offshore eastern Canada	2	2	0	15	4	4	0	60

The major's outlook

	All wells				Wildcats	
	First half 1987	Planned last half	Total Drilled 1987	Total 1986	Planned 1987	Drilled 1986
Alabama	18	27	45	24	14	10
Alaska	59	78	137	200	5	15
Arkansas	16	29	45	31	7	0
California	866	1,118	1,984	1,905	73	30
Onshore	843	1,093	1,936	—	68	—
Offshore	23	25	48	—	5	—
Colorado	25	79	104	64	15	18
Florida	3	2	5	11	1	5
Illinois	50	84	134	150	0	252
Iowa	0	1	1	0	1	0
Kansas	122	188	310	186	22	23
Kentucky	0	10	10	0	1	0
Louisiana	312	444	756	681	155	144
North	47	48	95	65	5	9
South	135	144	279	198	27	24
Offshore	130	252	382	418	123	111
Michigan	51	68	119	117	10	15
Mississippi	14	25	39	43	12	13
Montana	26	37	63	28	15	21
Nebraska	2	2	4	17	4	2
Nevada	2	1	3	2	2	2
New Mexico	74	116	190	219	24	20
North Dakota	11	29	40	37	13	17
Oklahoma	210	385	595	391	60	28
Oregon	0	12	12	9	12	9
Pennsylvania	0	36	36	98	0	0
Texas	1,047	1,172	2,219	1,823	174	214
South	178	223	401	494	59	42
East	62	97	159	161	12	10
West	676	682	1,358	952	46	105
North	95	111	206	76	21	10
Offshore	36	59	95	103	36	41
Utah	4	20	24	29	7	3
Virginia	0	4	4	0	0	0
Washington	0	1	1	0	1	0
West Virginia	2	16	18	15	2	1
Wyoming	48	197	245	193	43	54
Total U.S.	2,962	4,181	7,143	*6,276	673	*648

* Includes Georgia, Idaho, Missouri, and Ohio

the year.

Much of the year's work will be done in and around older producing areas. Improved recovery projects are under way in several areas, and infill drilling is common in older fields.

Deeper drilling is reported in the Hugoton field area of the Anadarko basin.

Last April's area-wide lease sale in the Gulf of Mexico drew healthy interest, and at midyear the prospects were good for a sizable increase in drilling in the gulf in the second half.

The counts of seismic crews and exploratory wells pinpoint the decline in U.S. wildcatting. From a record average of 681 land crews and marine vessels in 1981, seismic exploration activity fell to an average of only 197 crews and ships in 1986. The Society of Exploration Geophysicists (SEG) reports that the count fell further to 150 last March.

What majors plan. The majors will drill 19% of total U.S. wells this year, far greater than their traditional 12-15%, reflecting the continuing woes of independents in retiring debt and raising outside capital under a more restrictive tax code.

The majors also plan more wildcatting, contrary to the trend of total drilling when smaller operators are included.

Major companies will drill 137 wells in Alaska this year, down from the 200 recorded in 1986. Drilling in California will increase with the majors looking for 1,984 wells compared to 1,905 in 1986. Only 48 of these will be offshore, however.

There will be an estimated 104 major company wells drilled in Colorado, 63 in Montana, 190 in New Mexico, 24 in Utah, 40 in North Dakota, and 245 in Wyoming.

But despite the rather strong showing of the majors in the Rocky Mountain theater of operations, the overall drilling outlook remains clouded because of uncertain plans by independent operators.

There will be 134 major company drilling operations completed in Illinois, 310 in Kansas, 119 in Michigan, and 595 in Oklahoma this year.

In the Southeast, 45 wells will be drilled in Alabama by the major companies.

The majors will drill 45 wells in Arkansas this year, up from 31 in 1986. In Louisiana they will drill 756 wells this year compared to 681 in 1986.

There will be less wildcatting in Texas this year by the big companies, but a healthy increase in development plans is expected. The large companies will drill only 174 wildcats in the state vs. 214 in 1986, but the grand total will be 2,219 wells in Texas vs. 1,823 in 1986.

Regional plays. In one of the hardest hit areas, the Rocky Mountains, drilling produced only 88 new field discoveries in 1986, a success ratio of 12.2%. This year's prospects are not much better.

But despite a lackluster drilling report in the Rockies, there are a few action spots.

Sun is planning to drill offsets around its new Cretaceous Muddy sand oil discovery 40 miles west of Casper in the Wind River basins. The Powder River basin in Wyoming is also a busy place, though much quieter than in recent years.

New Minnelusa tests are being reported in the big basin, mostly in Crook and Campbell counties. There is also action under way and more planned in Converse County.

One company acquired leases on about 15,000 acres in the Minnelusa trend of Campbell County for more than $1.3 million. Drilling could begin in the last quarter (OGJ, June 8, 1987, p. 36).

A play into the Paleozoics of western Nebraska that began 7 years ago has expanded rapidly with more wildcats being reported weekly. Objectives are the Pennsylvanian rocks in an area of the Denver basin that has always been Cretaceous country.

The industry plans 160 wells in the state this year, many of these being in the deep play area. Wildcatting will be brisk here compared to other areas. The trend contains Bird, Mathewson, and Amazon fields, among others.

Drilling in southeastern Saskatchewan's Tableland play has turned exploratory interest in North Dakota to the northern part of the Williston basin. Several Winnipegosis deep oil finds across the border point to better days in the U.S. Williston play.

One of the nation's most successful drilling forays continues to excite the industry in Michigan where deep Ordovician pays have fired an exploratory program not seen in these parts since the early days of the Silurian Niagaran reef trend.

Michigan's Oil & Gas News of Mount Pleasant notes that in what has become the state's first race to spud a deep Central basin wildcat (thereby establishing the spacing pattern for a 9 square mile area) where drilling units of conflicting shape have been declared by permit application, Shell Western E&P appears to have come up with the first stake at 1-6 Haist in 6-16n-9w, Mecosta County.

The score in this deep campaign by late May was 39 successful Prairie du Chien wells, scattered over 13 counties in the Central basin of Michigan.▪

Rotary rig activity by states

	6-months average		%	Week ending		%
	1987	1986	change	6-29-87	6-30-86	change
Alabama	7.3	14.5	− 49.7	8	9	− 11.1
Alaska	7.3	14.7	− 50.3	9	18	− 50.0
Arizona	0.0	0.0	—	0	0	—
Arkansas	7.5	12.0	− 37.5	8	6	+ 33.3
California	52.8	54.5	− 3.1	60	39	+ 53.8
Colorado	19.0	29.7	− 36.0	23	14	+ 64.3
Florida	1.7	3.2	− 46.9	4	2	+100.0
Georgia	0.0	0.0	—	0	1	−100.0
Hawaii	0.0	0.2	−100.0	0	0	—
Idaho	0.0	1.5	−100.0	0	1	−100.0
Illinois	3.2	8.8	− 63.6	4	5	− 20.0
Indiana	1.2	1.2	0.0	0	1	−100.0
Iowa	0.5	0.0	—	1	0	—
Kansas	41.7	52.0	− 19.8	43	40	+ 7.5
Kentucky	0.7	2.8	− 75.0	1	3	− 66.7
Louisiana	110.0	170.5	− 35.5	112	98	+ 14.3
North	9.8	11.7	− 16.2	9	6	+ 50.0
Inland waters	18.8	23.7	− 20.7	24	14	+ 71.4
South	30.8	51.8	− 40.5	23	37	− 37.8
Offshore	51.0	83.3	− 38.8	56	41	+ 36.6
Maryland	0.0	0.2	−100.0	0	0	—
Michigan	22.7	29.2	− 22.3	20	17	+ 17.6
Minnesota	0.0	0.0	—	0	0	—
Mississippi	10.8	20.0	− 46.0	6	14	− 57.1
Missouri	0.0	0.0	—	0	0	—
Montana	5.8	13.0	− 55.4	6	4	+ 50.0
Nebraska	4.0	4.2	− 4.8	7	3	+133.3
Nevada	1.5	5.3	− 71.7	1	2	− 50.0
New Mexico	27.5	36.3	− 24.2	32	16	+100.0
New York	1.3	1.8	− 27.8	1	2	− 50.0
North Carolina	0.0	0.0	—	0	0	—
North Dakota	8.3	15.3	− 45.8	16	8	+100.0
Ohio	19.7	16.3	+ 20.9	12	11	+ 9.1
Oklahoma	126.5	166.3	− 23.9	115	98	+ 17.3
Oregon	0.0	0.0	—	0	0	—
Pennsylvania	13.7	15.7	− 12.7	19	15	+ 26.7
Rhode Island	0.0	0.0	—	0	0	—
South Carolina	0.0	0.0	—	0	0	—
South Dakota	0.3	0.5	− 40.0	2	0	—
Tennessee	0.0	0.5	−100.0	0	0	—
Texas	263.3	369.2	− 28.7	256	224	+ 14.3
Offshore	17.2	24.2	− 28.9	17	16	+ 6.3
Inland waters	0.5	3.2	− 84.4	1	2	− 50.0
Dist. 1 & 4	41.8	46.0	− 9.1	45	26	+ 73.1
Dist. 2 & 3	37.2	54.8	− 32.1	34	33	+ 3.0
Dist. 5 & 6	33.8	52.7	− 35.9	27	31	− 12.9
Dist. 7B & 9	25.3	42.0	− 39.8	23	30	− 23.3
Dist. 7C, 8 & 8A	92.3	129.7	− 28.8	94	75	+ 25.3
Dist. 10	16.7	17.5	− 4.6	15	11	+ 36.4
Utah	5.0	12.5	− 60.0	5	8	− 37.5
Virginia	1.7	5.0	− 66.0	2	7	− 71.4
Washington	0.0	0.0	—	0	0	—
West Virginia	12.3	12.0	+ 2.5	12	13	− 7.7
Wyoming	25.3	41.3	− 38.7	28	18	+ 55.6
Total U.S.	**799.2**	**1,130.8**	**− 29.3**	**813**	**697**	**+ 16.6**
Canada	137.5	228.7	− 39.9	144	68	+111.8
Canada, Offshore	1.3	5.8	− 77.6	3	6	− 50.0
Grand Total	**938.2**	**1,364.8**	**− 31.3**	**960**	**771**	**+ 24.5**

Source: Baker Hughes Inc. Note: Columns may not add to totals due to rounding.

WORLDWIDE GAS PROCESSING

AILLEEN CANTRELL
Director of Editorial Surveys

Capacities as of January 1, 1987, and average production

Country	No. plants	MMcfd		Production—1,000 gal/day (Average based on the past 12 months)								
		Gas capacity	Gas through-put	Ethane	Prop.	Isobut.	Process or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other	Total products
United States												
Alabama	5	173.0	136.3	16.0	153.8	18.3	114.3	....	1.2	75.7	....	379.3
Alaska	3	3,382.0	44.4	....	2.9	....	....	....	38.4	....	....	41.3
Arkansas	5	953.0	486.8	....	15.7	3.4	10.7	....	44.0	14.4	5.9	94.1
California	36	1,015.2	682.8	16.8	462.8	16.4	241.1	76.8	370.0	92.8	0.3	1,277.0
Colorado	43	1,016.2	467.7	....	205.6	0.2	43.5	27.5	564.5	35.2	10.6	887.1
Florida	2	790.0	688.7	105.4	151.0	16.4	78.1	....	....	77.7	....	428.6
Kansas	26	5,429.5	3,544.6	195.7	650.7	71.0	180.2	0.9	1,009.9	155.9	0.3	2,264.6
Kentucky	2	71.0	65.5	....	....	....	....	....	....	....	214.8	214.8
Louisiana	86	19,941.6	10,178.4	1,437.3	1,142.9	306.7	432.0	19.1	5,479.7	749.6	562.4	10,129.7
Michigan	27	4,744.6	1,600.7	....	90.5	....	101.9	....	778.0	20.8	29.9	1,021.1
Mississippi	5	899.0	355.3	....	9.6	....	8.9	....	16.2	11.2	....	45.9
Montana	7	52.0	28.9	....	27.7	3.9	7.8	15.1	21.5	9.6	0.9	86.5
Nebraska	2	3.5	2.0	....	....	....	....	....	6.5	....	....	6.5
New Mexico	30	3,435.4	1,878.8	297.0	196.0	16.6	67.0	....	3,892.5	80.2	17.1	4,566.4
North Dakota	11	346.7	250.2	....	192.2	....	94.9	....	161.8	96.0	13.6	558.5
Oklahoma	109	4,949.0	2,791.7	517.7	711.4	92.7	248.1	325.5	3,033.0	286.7	217.1	5,432.2
Texas	357	19,045.5	11,574.4	3,395.5	3,464.9	536.2	1,464.4	697.4	12,441.7	1,888.9	1,770.6	25,659.6
Utah	11	516.5	236.2	....	96.2	....	28.2	....	153.6	40.4	....	318.4
West Virginia	7	379.0	321.9	210.1	129.6	22.1	41.8	78.1	282.8	2.0	....	766.5
Wyoming	36	1,668.4	979.0	7.7	271.5	2.9	165.0	2.7	587.3	276.2	146.4	1,459.7
Total U.S.	**810**	**68,811.1**	***38,314.3**	**6,199.2**	**7,975.0**	**1,106.8**	**3,327.9**	**1,243.1**	**28,882.6**	**3,913.3**	**2,989.9**	***63,685.0**
Abu Dhabi	5	2,498.0	1,551.8	....	357.2	288.8	20.2	....	....	203.9	309.2	1,179.3
Algeria	4	5,335.2	4,268.2	....	....	....	....	632.8	....	....	5,449.2	6,082.0
Argentina	11	1,715.0	1,428.4	545.0	500.5	....	348.4	....	....	304.0	....	1,697.9
Australia	5	2,007.0	1,180.0	279.0	923.0	....	469.0	....	941.0	2,782.0	611.0	6,005.0
Austria	2	5.7	1.6	....	....	....	....	....	....	....	....	....
Bahrain	1	168.0	155.0	....	117.6	....	100.8	....	....	144.9	....	363.3
Bangladesh	8	460.0	80.0	....	....	....	....	....	....	1.3	14.9	16.2
Bolivia	2	474.0	177.3	....	1.4	2.5	....	161.7	....	61.5	136.9	364.0
Brazil	6	369.4	309.2	....	....	....	....	399.7	222.4	89.6	....	711.7
Brunei	2	998.0	819.0	....	19.9	....	....	....	86.1	238.0	....	344.0
Canada												
Alberta	391	20,832.4	11,326.3	4,426.9	1,767.8	220.9	824.3	1,119.0	4,208.3	2,705.4	104.0	15,376.6
British Columbia	12	2,236.4	929.9	....	137.6	....	82.1	....	....	94.8	....	314.5
Northwest Territories	2	196.0	22.1	....	....	....	....	....	....	....	....	....
Saskatchewan	14	195.4	114.7	39.2	....	....	....	....	81.4	0.4	23.2	144.2
Chile	2	470.0	430.0	....	194.9	....	122.9	....	....	104.2	....	422.0
China, Taiwan	4	271.0	105.7	41.2	29.8	1.9	16.9	....	1.6	14.9	....	106.3
Colombia	4	238.0	170.6	90.3	58.0	....	58.0	4.3	....	56.5	....	267.1
Denmark	1	450.0	200.0	....	....	....	....	....	....	....	50.0	50.0
Dominican Republic	1	....	....	....	....	....	....	....	....	....	277.2	277.2
Dubai	1	330.0	312.0	....	....	....	....	....	....	....	820.0	820.0
Ecuador	2	....	....	....	....	....	....	2.4	9.1	....	....	11.5
Egypt	7	1,019.0	973.0	....	....	211.7	....	187.8	....	....	927.1	1,326.6
France	1	570.0	563.0	....	139.0	....	132.0	....	....	270.0	....	541.0
Germany	5	542.9	451.0	....	....	....	....	....	....	....	....	....
Greece	1	10.5	9.5	....	....	....	....	....	85.0	....	....	85.0
Hungary	12	947.1	567.5	....	49.3	9.6	50.0	111.6	302.1	155.0	387.7	1.065.3
Indonesia	10	884.3	612.4	....	498.2	....	....	51.6	445.2	219.7	327.9	1,542.6
Italy	17	7,249.0	1,462.0	....	....	....	....	24.1	159.1	10.9	....	194.1
Kuwait	1	1,680.0	360.0	....	834.0	....	548.0	....	....	305.0	85.0	1,772.0
Libya	7	1,851.0	1,227.0	....	....	....	....	37.8	5,577.0	....	551.0	[illegible],165.8
Malaysia	2	282.0	120.0	....	140.0	120.0	....	55.0	....	150.0	....	465.0
Mexico	10	4,334.0	3,249.0	3,487.7	5,657.2	3.5	153.0	385.4	....	316.5	14.0	10,017.3
Netherlands	1	440.0	81.5	....	....	....	....	....	....	....	5.5	5.5
New Zealand	2	248.0	127.0	....	30.0	....	....	....	....	10.0	....	40.0
Norway	2	950.0	401.0	....	693.3	91.2	234.3	....	201.6	178.7	....	1,399.1
Pakistan	5	950.0	810.9	....	....	....	....	47.0	....	7.6	7.8	62.4
Peru	2	70.0	37.0	....	2.1	....	0.8	7.2	25.4	....	3.2	38.7
Qatar	2	560.0	260.0	....	496.7	....	313.8	....	....	217.6	....	1,028.1
Saudi Arabia	5	4,300.0	....	....	....	....	....	....	1,176.0	....	....	1,176.0
Sharjah	2	1,020.0	970.0	....	88.1	....	96.8	....	....	....	2,251.3	2,436.2
United Kingdom	7	2,648.2	1,483.0	....	332.0	....	291.0	....	116.8	1,748.5	79.6	2,567.9
Venezuela	17	4,251.0	3,348.0	....	394.5	137.2	132.7	440.8	1,222.4	239.2	....	2,566.8
Total, outside U.S.	**598**	**74,056.5**	**40,894.8**	**8,908.3**	**13,462.1**	**1,087.3**	**3,995.0**	**3,660.2**	**14,860.5**	**10,830.1**	**12,435.7**	**69,048.2**

*Includes data from Phillips Petroleum Co., Bartlesville, Okla., not provided in state-by-state totals above.

Company, plant, location	MMcfd Gas capacity	MMcfd Gas throughput	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
ALABAMA											
Exxon Co. USA—Big Escambia Creek, Escambia Co., 4-1n-7e	40.0	30.0	6-7	16.0	49.1	....	44.9	....	....	33.8	....
Mobil Oil Exploration & Producing Southeast Inc.—Movico, Mobile Co.	10.0	NR	6	....	....	....	....	....	1.2	....	....
Phillips Petroleum Co.—Chatom, Washington Co., ne4-29-6n-4w	31.0	NR	3	....	....	....	....	....	....	....	....
Texaco Inc.—*Hatter's Pond, Mobile Co., 10-2s-1w	35.0	34.2	3	....	45.1	18.3	21.8	....	....	17.7	....
Unocal—*Chunchula, Mobile Co., 22-1s-2w	57.0	39.3	3	....	59.6	....	47.6	....	....	24.2	....
Total	**173.0**	**136.3**		**16.0**	**153.8**	**18.3**	**114.3**	....	**1.2**	**75.7**	....
ALASKA											
ARCO Alaska—Prudhoe Bay,	3,300	....	....	....	....	....	....	....	....	....	....
Chevron USA Inc.—*Swanson River LTS, Kenai Borough, 4-7n-9w	30.0	30.4	3	....	2.9	....	....	....	12.1	....	....
Marathon Oil Co.—Trading Bay, Kenai Borough, 5-18n-15w-5In	52.0	14.0	7	....	....	....	....	....	26.3	....	....
Total	**82.0**	**44.4**		....	**2.9**	....	....	....	**38.4**	....	....
ARKANSAS											
Amoco Production Co.—*Chalybeat Springs, Columbia Co., 34-19s-19w	28.0	25.1	7	....	....	....	....	....	24.6	....	....
Arkla Energy Resources—Hamilton, Columbia Co., se9-18s-21w	20.0	11.7	$^{23}2$	....	9.7	3.4	4.7	....	....	5.4	$^{11}2.9$
Associated Natural Gas Inc.—*Walker Creek, Columbia Co., 24-19s-23w	30.0	27.0	$^{17}2$	....	....	....	....	....	4.4	....	....
Cities Service Oil & Gas Corp.—*Walker Creek, Columbia Co., 23-19s-23w	25.0	23.0	2	....	6.0	....	6.0	....	....	9.0	$^{11}3.0$
Natural Gas Pipeline Co. of America—PP 370, White County, 29-7n-7w	850.0	400.0	3	....	....	....	....	....	15.0	....	....
Total	**953.0**	**486.8**		....	**15.7**	**3.4**	**10.7**	....	**44.0**	**14.4**	**5.9**

Legend

To arrive at more accurate totals, natural-gas throughput and liquids production are estimated at 80% capacity in those cases where only capacities are available. This explains apparent discrepancies in the addition of some columns.

The letters NR mean no response.

*Indicates cycling operations.

The symbol < denotes less than 100 gal/day.

The process/conditioning methods in the third column are identified by the following numbers:

1—absorption
2—refrigerated absorption
3—refrigeration
4—compression
5—adsorption
6—cryogenic-Joule-Thomson
7—cryogenic-expander.

Agents used in processes 1, 2, and 5 are indicated by superscripts as follows:

^{1}absorption oil
^{2}amine
^{3}anhydrous ammonia
^{4}Asorball
^{5}DEA
^{6}desiccant
^{7}DGA
^{8}diesel-No. 1
^{9}ep naphtha
^{10}freon
^{11}glycol
^{12}hot potassium carbonate
^{13}iron sponge
^{14}Jet A
^{15}kerosine
^{16}kero-propane
^{17}lean oil
^{18}MDEA,
^{19}Mea,
^{20}mineral seal oil
^{21}mole sieve
^{22}naphtha
^{23}natural gasoline
^{24}propane
^{25}Q-Sol
^{26}Selexol
^{27}silica gel
^{28}Sorbead
^{29}Sulfinol
^{30}Sulphalene
^{31}TEG
^{32}Varsol
^{33}mw100
^{34}mw110
^{35}mw115
^{36}mw120
^{37}mw127
^{38}mw130
^{39}mw131
^{40}mw133
^{41}mw140
^{42}mw145
^{43}mw150
^{44}mw160
^{45}mw175

Products listed in the last column are identified by numbers:

1—isopentane
2—upgraded motor fuel
3—diesel
4—kerosine
5—ethane-propane mix
6—solvent naphtha
7—jet fuel
8—normal pentane
9—residuum, bottoms
10—distillate, fuel oil
11—condensate
12—gas oil.

Figures in parentheseis do not represent primary production, and are not added in state totals.

Since this compilation includes cycling plants reprocessing pipeline gas, totals shown here for gas throughput do not relate directly to government data on total gas processed, or sold. Similarly, liquids production figures are based on yearly average and do not necessarily reconcile with government data.

The Gas Processing and Sulfur surveys in this report are available on diskette for $300 and $100 respectively. Contact Oil & Gas Journal Energy Database.

CALIFORNIA

Company, plant, location	MMcfd Gas capacity	MMcfd Gas through-put	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Arco Oil & Gas Co.—No. Coles Levee No. 8, Kern Co., 32-305-25e MDB&M	20.0	12.2	[24]2	....	27.2	2.6	7.5	....	....	9.0	....
Ojai Timber No. 18, Ventura Co., Rancho Ojai 36	6.9	3.0	2	....	....	....	....	....	....	0.4	....
Chevron USA Inc.—Carpinteria, Santa Barbara Co., 33-4n-25w	23.0	6.7	3	....	0.9	....	3.7	....	....	1.9	....
Huntington Beach, Orange Co., 3-6s-11w	3.5	2.5	3	....	....	....	....	....	3.7	....	....
Inglewood LTS, Los Angeles Co., 8-25-4w	15.0	9.2	3	....	....	....	....	....	15.9	....	....
Kettleman 3-P, Kings Co., 3-22s-17e	10.0	6.1	3	....	....	....	....	....	8.7	....	....
McKittrick Seventeen-Z, Kern Co., 17-30s-22e	60.0	54.0	[1-24]2	....	46.1	....	....	....	45.4	....	....
Murphy-Coyote, Orange Co., 18-3s-10w	5.0	1.4	3	....	....	....	....	....	3.4	....	....
Race Track 32-Z, Kern Co., 32-30s-29e	7.0	0.6	3	....	....	....	....	....	0.3	....	....
Taft 1-C LTS, Kern Co., 1-32s-23e	16.0	11.7	3	....	4.3	....	4.7	....	15.4	....	....
Torrance, Los Angeles Co., 24-4s-14w	3.0	0.9	3	....	....	....	....	....	1.4	....	....
Department of Energy—35R, Kern Co., 30s-23e-35-R	94.0	47.2	[43]1	....	39.7	....	32.6	....	28.4	....	....
LTS-1, Kern Co., 30s-23e-35R	100.0	106.4	3	....	89.4	....	73.5	....	65.0	....	....
LTS-2, Kern Co., 30s-23e-35R	100.0	108.1	3	....	90.9	....	74.7	....	66.0	....	....
Marathon Oil Co.,—*South Coles Levee, Kern Co., 3-31s-25e	80.0	49.0	1	....	17.9	2.7	5.1	....	....	13.5	....
Petrolane Lomita Gasoline Co.—Harbor, Los Angeles Co.	40.0	17.0	4	....	....	....	....	....	5.0	....	....
Signal Hill, Los Angeles Co.	14.0	6.5	3	....	2.8	....	....	....	20.0	....	....
Phillips Petroleum Co.—Huntington Beach, Orange Co., 3-6s-11w	15.0	NR	3	....	....	....	....	....	6.1	....	....
Santa Fe Energy Co.—Rincon, Ventura Co., 17-3n-24w SBB&M	15.0	5.3	[17]1	....	8.7	....	3.1	....	....	....	....
Shell California Production Inc.—Clark Ave., Santa Barabara Co., 9-9n-33w	3.6	0.1	1	....	....	....	....	....	0.9	....	....
Kernridge, Kern Co., 32-28s-1e	50.0	34.0	2	16.8	12.9	....	....	31.4	....	....	....
Molino, Santa Barbara Co., 31-5n-31w	20.0	3.0	2	....	0.9	....	....	26.7	....	....	....
Sun Exploration & Production Co.—Newhall, Los Angeles Co., 27-4n-17w	NR	21.3	[17]2	....	5.2	....	....	....	7.6	....	....
Texaco Inc.—Buena Vista Hills, Kern Co., 8-32s-24e MDB&M	20.0	7.5	[17]1	....	11.5	....	....	....	10.3	....	....
Cymric, Kern Co., 26-29s-22e MDB&M	4.0	2.3	3	....	....	....	....	....	2.3	....	....
Honor Rancho, Los Angeles Co., 36-5n-17w-SBBM	18.0	0.3	3	....	....	....	....	....	0.2	....	....
Lost Hills, Kern Co., 9-27s-21e	60.0	32.7	3	....	19.7	....	....	....	39.2	....	....
Montebello, Los Angeles Co.	2.0	0.8	6	....	....	....	....	....	....	0.3	....
Shiells Canyon, Ventura Co., 4-4n-19w-SBBM	18.0	9.8	[17]2	....	5.9	4.5	....	....	....	7.2	....
Ventura Co., 27-3n-23w SBB&M	20.0	15.6	[17]2	....	19.4	6.6	15.2	....	....	13.9	....
Unocal—Battles, Santa Barbara Co., 24-10n-34w SBB&M	35.0	11.5	[43]1	....	12.0	....	10.2	....	....	13.3	....
Bell, Los Angeles Co., 6-3s-11w, SBB&M	0.6	0.5	7	....	....	....	....	....	....	....	[11]0.3
*Coalinga Nose, Fresno Co., 7-20s-16e, SBB&M	70.0	64.3	7	....	40.6	....	10.8	....	....	26.1	....
Dominguez, Los Angeles Co., 33-3s-9w SBB&M	3.0	2.3	3	....	....	....	....	....	4.6	....	....
Santa Clara Valley, Ventura Co., 31-4n-18w, SBB&M	17.0	11.2	7	....	....	....	....	18.7	....	7.2	....
Stearns, Orange Co., 7-3s-9w SBB&M	20.0	5.8	[43]1	....	6.8	....	....	....	20.2	....	....
Total	**1,015.2**	**682.8**		**16.8**	**482.8**	**16.4**	**241.1**	**76.8**	**370.0**	**92.8**	**0.3**

COLORADO

Company, plant, location	MMcfd Gas capacity	MMcfd Gas through-put	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Amoco Production Co.—Peoria, Arapahoe Co., 33-4s-60w	12.0	3.1	7	....	8.2	....	....	....	8.0	....	[11]0.3
Spindle, Weld Co., 34-2n-67w	37.0	23.9	7	....	....	....	....	....	87.4	....	[11]10.0
Wattenberg, Adams Co., 32-3s-65w	250.0	53.9	7	....	....	....	....	....	84.5	....	....
Associated Natural Gas Inc.—											
Eaton, Weld Co., se 34-7n-66w	15.0	9.9	3	....	....	....	....	....	27.4	....	....
Greeley, Weld Co., sw 25-5n-66w	20.0	12.6	3&6	....	....	....	....	....	36.1	....	....
Kersey, Weld Co., se 35-4n-66w	24.0	20.6	3	....	....	....	....	....	45.8	....	....
Lucerne, Weld Co., nw¼ se½ 28-6n-65w	15.0	11.3	3&7	....	....	....	....	....	35.4	....	....
Berthoud Gas Co.—Berthoud, Larimer Co., sw 16-4n-69w	2.5	0.3	3	....	....	....	....	....	1.0	....	....
Brighton Gas Processors—Brighton, Weld Co., se4 se4 28-1n-67w 6th PM	2.5	1.0	3	....	....	....	....	....	4.2	....	[11]0.3
Cabin Creek Gas—Cabin Creek, Adams Co., sw4 nw4 31-3s-59w 6th PM	1.5	0.2	3	....	....	....	....	....	1.7	....	[11]<0.1
Celsius Energy Co.—Dove Creek, Dolores Co., 5-40n-18w	10.0	4.9	3	....	....	....	....	....	10.7	....	....
Cerrito Land Co.—Piceance Creek, Rio Blanco Co., 15-25-96w (25 miles se of Rangely)	40.0	15.0	[17-24]2	....	6.0	....	....	....	6.0	....	....
Champlin Petroleum Co.—Mt. Pearl, Cheyenne Co., 35-13s-48w	1.7	1.6	3	....	....	....	....	....	3.8	....	....
Chevron USA Inc.—Rangely Hagood, Rio Blanco Co., 23-2n-102w	10.0	6.0	2	....	....	....	....	....	21.0	....	....
Coors Energy Co.—Wattenberg, Weld Co., 25-1n-68w	8.0	5.7	3	....	....	....	....	....	4.7	....	....
Damson Gas Processing Corp.—Roggen, Main, Weld Co., se¼ sw¼ 24-2n-63w	22.0	16.0	7	....	40.0	....	....	....	35.0	....	....
Roggen Tampa, Weld Co., se¼ sw¼ 24-2n-63w	9.0	9.0	7	....	15.0	....	....	....	10.0	....	....
Vallery, Morgan Co., 15-3n-59w	1.5	1.0	3	....	....	....	....	....	2.8	....	....
Enron Gas Processing Co.—Greeley, Weld Co., sw 25-5n-6w	6.0	3.3	3	....	3.5	0.2	1.5	....	....	1.4	....
Greeley Gas Co.—Clyde, Prowers Co., 19-23s-45w	5.0	2.3	3	....	....	....	....	2.0	....	....	....

Company, plant, location	MMcfd Gas capacity	MMcfd Gas through-put	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Gulf Energy Gathering & Processing—											
Chalice, Arapahoe Co., 10-4s-64w	3.0	1.4	3	....	....	....	....	4.7	....	....	....
Running Creek, Elbert Co., 21-6s-64w	3.5	3.2	3	....	....	....	....	13.2	....	....	....
Koch Hydrocarbon Co.—Third Creek, Adams Co., 18-25-65w	25.0	15.0	2	....	16.8	....	....	....	49.9	....	....
Loveland Gas Processing Cl.—*Loveland, Larimer Co., se-se-se30-5n-68w	6.0	2.0	3	....	3.9	....	....	....	....	†14.4	....
McMoRan Oil & Gas Co.—Yenter, Logan Co., nw¼ 2-8n-54w	8.0	4.5	²2	....	9.5	....	....	7.6	....	....	....
NGL Production Co.—Foundation Creek, Rio Blanco Co., 26-45n-102w	20.0	4.5	3	....	....	....	....	....	2.9	....	....
North Douglas Creek, Rio Blanco Co., 19-1s-101w	20.0	7.6	3	....	....	....	....	....	6.7	....	....
Northwest Pipeline Corp.—Ignacio, La Plata Co., sw¼ 36-34n-114w	300.0	176.0	7	....	84.0	....	42.0	....	....	27.0	....
Planet Engineers Inc.—McClave, Kiowa Co., sw½ 32-20s-48w	7.5	2.4	2	....	3.0	....	....		....	†2.4	....
Rocky Mountain Natural Gas Cl—											
Black Sulfur, Rio Blanco Co.	NR	1.2	3	....	....	....	....	....	0.3	....	....
Collbran, Mesa Co., 35-9s-95w	5.0	2.2	3	....	....	....	....	....	0.6	....	....
DeBeque, Garfield Co., 6-8s-97w	15.0	3.5	3	....	....	....	....	....	0.2	....	....
Piceance, Rio Blanco Co., 22-1n-97w	15.0	1.0	3	....	....	....	....	....	0.7	....	....
South Canyon, Garfield Co., 3-8s-104w	15.0	8.1	3	....	....	....	....	....	1.6	....	....
Sun Exploration & Production Co.—Denver Central, Arapahoe Co., 5-5s-62w	12.0	3.9	¹⁷2	....	12.1	....	....	....	9.8	....	....
Dragon Trail, Rio Blanco Co., 35-2s-102w	18.0	3.9	¹⁷2	....	3.6	....	....	....	3.7	....	....
Texaco Inc.—Wilson Creek, Rio Blanco Co., 27-3n-94w	4.5	0.4	3	....	....	....	....	....	10.0	....	....
Texas Oil & Gas Corp.—Baca County, 11-33s-42w Grid 9	5.0	0.7	3	....	....	....	....	....	0.4	....	....
Unocal—Adena, Morgan Co., 12-1n-58w	4.0	0.1	3	....	....	....	....	....	3.7	....	....
Vessels Gas Processing Co.—Irondale, Adams Co. se¼ 24-2s-62w	4.0	2.2	3	....	....	....	....	....	11.5	....	....
Vessels Gas Processing Ltd.—Ft. Lupton, Weld Co., se¼ 26-1n-67w	30.0	22.0	3	....	....	....	....	....	35.0	....	....
Vessels Oil & Gas Co.—Ft. Lupton Fractionator, Weld Co., se½ 28-In-67w	...	...	§	(37.8)	(56.3)	....	(48.0)	....	....	(32.9)	....
Western Gas Processors Ltd.—											
Lanson Farms, Weld Co., nw4-ne4 35-2n-68w	1.5	0.3	3	....	....	....	....	....	2.0	....	....
Total	**1,016.2**	**467.7**		....	**205.6**	**0.2**	**43.5**	**27.5**	**584.5**	**35.2**	**10.6**

†Butane-gasoline mix. §Fractionation. (Figures in parenthesis do not represent primary production, and are not added in state totals).

FLORIDA

Company, plant, location	MMcfd Gas capacity	MMcfd Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Enron Gas Processing Co.—Brooker, Bradford Co.	700.0	654.0	¹⁷⁻²⁴2	....	50.2	16.4	17.9	....	....	43.0	....
Exxon Co. USA—Jay, Santa Rosa Co., 9 n43-5n-29w	90.0	34.7	6-7	105.4	100.8	....	60.2	....	....	34.7	....
Total	**790.0**	**688.7**		**105.4**	**151.0**	**16.4**	**78.1**	....	....	**77.7**	....

KANSAS

Company, plant, location	MMcfd Gas capacity	MMcfd Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Amoco Production Co.—Ulysses, Grant Co., 5-29s-38w	400.0	404.4	¹⁷⁻⁴⁴2	....	64.9	....	....	....	141.3	....	....
Anadarko Production Co.—Cimarron, Seward Co., 23-33s-32w	20.0	7.8	⁴¹2	....	3.4	....	....	....	4.3	....	....
Interstate, Morton Co., 29-34s-43w	16.0	4.0	⁴¹2	....	2.1	....	....	....	2.9	....	....
Lone Star, Hugoton Co., se 18-33s-35w	4.0	1.2	3	....	....	....	....	....	0.9	....	....
Woods, Seward, 22-33s-34w	11.0	7.2	⁴¹2	....	3.1	....	....	....	5.7	....	....
Cities Service Oil and Gas Corp.—Cheney, Kingman Co., nw4 22 28s-5w	100.0	25.0	7	....	....	....	....	....	49.0	....	....
Hutchinson, Reno Co., sw4 22-23s-6w	....	....	†	(91.0)	(382.0)	(62.0)	(145.0)	....	....	(138.0)	....
Jayhawk, Grant Co., 2-29s-35w	550.0	372.5	2&6	....	....	....	....	....	368.0	....	....
Midway, Kingman Co., 33-27s-5w	30.0	23.0	2	....	....	....	....	....	30.0	....	....
Spivey, Harper Co., 5-31s-8w	66.0	20.4	1	....	21.0	....	5.2	....	....	20.0	....
Sunflower, Scott Co., 17-18s-33w	168.0	76.0	3&6	....	....	....	....	....	103.0	....	....
Wichita, Sedgwick Co., 17-28s-1e	89.0	70.0	7	....	....	....	....	....	91.0	....	....
Wilburton, Morton Co., 33-34s-41w	5.0	2.4	3	....	....	....	....	....	10.7	....	....
Enron Gas Processing Co.—Bushton ethane, Ellsworth Co., 31-17s-9w	540.0	507.1	7	193.5	....	....	....	....	....	....	....
Bushton hydrocarbon, Ellsworth Co., 31-17s-9w	950.0	892.5	¹⁷⁻²⁴2	....	506.0	70.6	138.2	....	....	117.6	....
Enron Helium Co.—Ellsworth Co., 31-17s-19w	520.0	138.0	6	....	....	....	....	....	....	....	†0.3
Kansas Refined Helium Co.—*Otis, Rush Co., s½ 26-17s-16w 29.6 ac	24.0	17.0	3	....	0.1	0.4	0.7	....	....	1.2	....
KN Energy Inc.—Scott City Helium, Scott Co., 17-18s-33w	75.0	62.0	3	2.2	33.8	....	18.5	....	....	4.3	....
Scott City NGL, Scott Co., 17-18s-33w	150.0	99.8	1	....	....	....	2.0	....	....	12.8	....
Mesa Limited Partnership—Ulysses, Grant Co., 10-30s-37w	242.0	49.0	¹⁷2	....	....		....	....	65.1	....	....
Mobil Oil Corp.—Hickok, Grant Co., 31-28s-35w	210.0	100.2	1	....	....		....	....	35.8	....	....
National Helium Corp.—Seward Co., 23-33s-32w	1,000.0	478.0	3	....	1.2	....	15.5	....	52.2	....	....
Northern Natural Gas Co.—Holcomb, Finney Co., 3-24s-34w	200.0	168.9	3	....	....	....	....	....	35.4	....	....
Peoples Natural Gas Co.—Burrton, Harvey Co., 21-23s-34w	4.5	3.0	3	....	....	....	....	0.9	....	....	....

Company, plant, location	MMcfd Gas capacity	MMcfd Gas through-put	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Texaco Inc.—Medicine Lodge, Barber Co. 13-32s-12w	30.0	6.9	^{17}1	....	5.9	....	....	....	5.8	....	....
Minneola, Ford Co., 13-29s-25w	25.0	8.3	^{17}2	....	9.2	....	....	....	8.8	....	....
Total	**5,429.5**	**3,544.6**		**195.7**	**650.7**	**71.0**	**180.2**	**0.9**	**1,009.9**	**155.9**	**0.3**

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†Fractionation. (Figures in parenthesis do not represent primary production, and are not added in state totals). ‡Helium—MMcfd.

KENTUCKY

Company, plant, location	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Kentucky Hydrocarbon—Dwale Cryogenic, Floyd Co.	20.0	16.3	3&7	....	....	....	....	....	....	....	†31.1
Maytown, Floyd Co.	51.0	49.2	3-6-7	....	....	....	....	....	....	....	†183.7
Total	**71.0**	**65.5**		....	....	....	....	....	....	....	**214.8**

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†Ethane and heavier hydrocarbons in one stream.

LOUISIANA

Company, plant, location	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Amoco Production Co.—TSMA, Vermilion Par., 11-14s-1e	297.0	113.7	^{35}2	....	....	....	....	....	77.9	....	....
Arco Oil & Gas Co.—*Bayou Sale, St. Mary Par., 17-ILS-9e	97.0	36.3	$^{10\text{-}17}$2	....	8.8	....	5.0	....	....	5.8	....
Arkla Inc.—Bistineau, Webster Par., se-36-17n-10w se 31-17w-9w	60.0	10.9	^{15}1	....	....	....	....	2.2	....	2.5	^{11}0.8
Gayles, Caddo Par., 30-16n-12w	3.0	1.3	3	....	....	....	....	....	....	0.3	....
Associated Natural Gas Inc.—Minden, Webster Par.	55.0	30.0	2	....	....	....	....	....	51.0	....	....
Bruin Petroleum Inc.—*Port Hudson, East Baton Rouge, Par.	40.0	35.0	...	....	....	....	....	....	25.0	....	....
Cities Service Oil and Gas Corp.—Lake Charles, Calcasieu Par., 19-10s-9w	....	....	†	(351.0)	(212.0)	(76.0)	(57.0)	....	....	(116.0)	....
Claiborne Gasoline Co.—Claiborne Par., 20-21n-4w	NR	33.6	2	....	27.0	12.7	16.3	....	....	....	^{2}88.4 ^{3}31.8 ^{4}0.8 ^{10}36.8
Coastal Oil & Gas Corp.—Pelican, St. Mary Par., 51&52 15s-11e	250.0	183.0	7	....	....	....	....	....	182.8	....	....
Conoco Inc.—Acadia Par., 31-9s-1w	45.0	32.5	7	12.4	5.5	....	3.4	....	....	....	^{5}0.6 ^{6}5.6 ^{9}0.1
Gillis, Calcasieu Par., se¼ sw¼ 14-9s-8w	180.0	169.4	7	148.2	73.0	23.7	18.1	....	....	33.1	^{11}2.8
Grand Chenier, Cameron Par., 2-39-40 15s-6w	950.0	334.1	^{17}2&7	132.8	68.6	26.0	18.1	....	....	41.5	....
CSX OIL & GAS CORP.—Bastian Bay, Plaquemines Par., 42-20s-28e	175.0	162.0	7	....	....	....	....	....	119.0	....	....
Eunice, Acadia Par., sw¼ nw¼-12-7s-2w	1,350.0	1,030.0	^{17}2&7	332.0	252.1	82.7	71.2	....	....	165.0	....
Lake Enfermer, LaFourche Par., 9-20s-23e	40.0	30.0	7	....	....	....	....	....	34.0	....	....
Damson Gas Processing Corp.—Kings Bayou, Cameron Par., ne¼ 34-14s-7w	80.0	14.5	2	....	....	....	....	....	12.0	....	....
*Neale, Beauregard Par.	2.0	0.5	3	....	....	....	....	....	1.5	....	....
Davis, J.L.—Perry Point, Vermilion Par., 41-10-2e	15.0	8.0	6	....	....	....	....	....	10.0	....	....
White Castle, Iberville Par., 15-10s-13e	7.5	3.0	6	....	....	....	....	....	12.0	....	....
Exxon Co.—Bluewater, Acadia Par., 34-10s-1w	950.0	523.0	6-7	220.3	137.5	....	96.0	....	....	96.4	....
Garden City, St. Mary's Par., 45-46-15s-10e	600.0	110.0	2	49.1	30.6	....	14.5	....	....	15.5	....
Grand Isle, Jefferson Par., 32-21s-25e	100.0	84.0	7	....	....	....	....	....	170.5	....	^{11}1.1
FMP Operating Co.—Chenier No. 1, Vermilion Par., 23-12s-1e	21.0	13.0	7	....	....	....	....	....	30.2	....	....
Gulf Energy Processing Corp.—Lake LaRose, St. Martin Par., 29-9s-8e	16.0	4.3	7	....	....	....	....	7.6	....	....	....
Kerr-McGee Corp.—Bayou Crook Chene, St. Martinville Par., 34-10s-9e	12.5	NR	2	....	....	....	....	....	11.7	....	....
Louisiana Land & Exploration Co.—Pointe au Chien, Terrebonne Par., 18-19s-20e	125.0	80.0	7	....	....	....	....	....	55.0	....	....
Marathon Oil Co.—Burns Point, St. Mary Par., 10-17s-9e	200.0	62.0	7	....	....	....	....	....	52.0	....	....
Cotton Valley, Webster Par., 26-21n-10w	65.0	23.0	7	27.0	12.2	....	9.2	....	....	8.1	^{11}11.2
Mitchell Energy & Development Corp.—Jackson Par.	5.0	0.5	3	....	....	....	....	....	0.7	....	....
Mobil Oil Exploration & Producing Southeast Inc.—Cameron Par., 23-15s-13w	310.0	265.0	7	....	....	....	....	....	168.0	....	....
Cow Island, Vermilion Par., 29-13s-2e	950.0	300.0	^{17}2	....	....	....	....	....	231.0	....	....
Dulac, Terrebonne Par., 2&63 10s-17e	55.0	14.0	7	....	....	....	....	....	21.0	....	....
Grand Chenier, Cameron Par., 45&42-15s-6w	125.0	27.0	7	....	....	....	....	....	23.6	....	....
Iowa, Jefferson Davis Par., 18-9s-6w	500.0	354.0	7	....	....	....	....	....	176.2	....	....
Lowry, Cameron Par., 16-12s-4w	300.0	135.0	7	100.0	39.0	14.0	8.6	....	....	23.0	....
Riverside fractionation, Ascension Par., 8-10s-2e 46-9s-2e	....	....	†	(245.8)	(206.0)	(63.6)	(63.4)	....	....	(95.3)	....
Sea Robin 2, Vermilion Par., 21-13s-14e	150.0	50.0	7	....	....	....	....	....	50.4	....	....
South Timbalier, LaFourche Par., 28-20s-22e	125.0	104.0	7	....	....	....	....	....	70.1	....	....
Petro-Hunt Corp.—Kinder, Allen Par., 23-5s-5w	25.0	8.0	^{17}2	....	5.4	....	3.2	....	....	2.7	....
Phillips Petroleum Co.—No. Erath and Grosse Isle, Vermilion Par., sw4 se4 41-13s-4e	45.0	NR	2	....	....	....	....	....	....	....	....
Rollover, Jefferson Davis Par., nw4 22-11s-3w	190.0	NR	^{24}2	....	....	....	....	....	....	....	....
Valentine, LaFourche Par., 46-100-17-20e	15.0	NR	7	....	....	....	....	....	....	....	....
Placid Oil Co.—*Black Lake, Natchitoches Par., 14-11n-6w	217.5	207.0	^{24}2	....	....	....	....	....	159.7	....	^{11}23.3

Company, plant, location	MMcfd Gas capacity	Gas through-put	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Patterson II, St. Mary Par., 48-15s-11e	400.0	61.7	7	....	....	....	....	....	71.4	....	....
Resources Extraction & Processing Co.—Bayou Vista 1, St. Mary Par., 11-155-11e	200.0	200.0	7	64.2	24.3	7.6	7.3	....	....	16.0	....
Shell Western E&P Inc.—Barracuda, Cameron Par., 15s-13w	195.0	112.0	7	....	....	....	....	....	135.4	....	....
Black Bayou, Cameron Par., 17-12s-12w	18.0	11.0	2	....	....	....	....	....	3.8	....	....
Calumet, St. Mary Par., 11, 12, 51, 52,-15s-11-3	1,200.0	515.0	2	....	....	....	....	....	319.5	....	....
Crawfish, St. Charles Par., 36-13s-8e	120.0	48.0	7	....	....	....	....	....	45.8	....	....
Norco fractionator, St. Charles Par., 6-12s-8e	....	....	†	(403.3)	(320.7)	(107.9)	(128.0)	....	....	(167.3)	....
North Terrebonne, Terrebonne Par., 19,20, 29,33-17s-15e	1,250.0	587.0	2	....	....	....	....	....	607.6	....	....
Stingray, Cameron Par., 33&34-15s-13w	295.0	207.0	2	....	....	....	....	....	112.7	....	....
Tebone fractionator, Ascension Par., 45&46-9s-2e	....	....	†	(192.5)	(179.1)	(57.1)	(56.5)	....	....	(122.4)	....
Timbalier Bay, Terrebonne Par., nw4 of 32-16 sw 4 of 33-19s-19e	100.0	33.0	7	....	....	....	....	....	46.4	....	....
Toca, St. Bernard Par., 54-14s-14e	830.0	447.0	2&7	....	....	....	....	....	584.9	....	....
*Weeks Island, Iberia Par., 37-14s-6e	130.0	31.0	2	....	2.8	....	....	9.3	....	....	....
Yscloskey, St. Bernard Par., 39-13s-15e	1,850.0	847.0	2	....	....	....	....	....	567.7	....	....
Sid Richardson Carbon & Gasoline Co.—Hico-Knowles, Lincoln Par., 9 acres sw¼ of se¼ 10 & nw¼ of ne¼ 15-20n-3w	15.0	3.2	7	....	....	....	....	....	5.6	....	[11]100.0
Sun Exploration & Production Co.—Delhi, Richland Par., 15-17n-9e	22.0	20.8	6	....	9.3	2.3	3.7	....	....	17.3	....
*Fordoche, Pointe Coupee Par., 41-6s-8e	50.0	32.0	[17]2	....	....	....	....	....	32.6	....	....
*Gillis-English Bayou, Calcasieu Par., 26-8s-5w	20.0	9.5	[17]2	....	....	....	....	....	16.2	....	....
Maurice, Lafayette Par., 31-10s-4e	32.0	18.9	[17]2	....	....	....	....	....	43.6	....	....
South Sarepta, Bossier Par., 21-22n-11w	25.0	8.7	[17]2	....	....	....	....	....	12.2	....	....
Tenneco Oil Processing & Marketing—Aymond, St. Mary Par., 13-14s-9e	50.0	26.9	7	....	....	....	....	....	41.6	....	....
Gibson, Terrebonne Par., 77-16s-15e	100.0	84.7	7	....	....	....	....	....	....	97.7	....
Plaquemine, Iberville Par., 46-10s-12e	225.0	136.0	7	....	40.8	19.0	17.7	....	....	41.0	[5]140.0
Sabine Pass, Cameron Par.	200.0	73.2	7	....	....	....	....	....	82.2	....	....
Plaquemine, Iberville Par.	225.0	116.2	7	....	39.4	17.3	16.3	....	....	32.5	[5]119.1
Stephen, Claiborne Par., 6&7-13s-12e	35.0	4.3	2	....	3.5	....	3.4	....	....	2.5	....
St. Landry, Evangeline Par., 35-2s-2e	70.0	62.4	2	....	29.4	....	20.1	....	....	13.2	....
Texaco Inc.—Alligator Bayou, St. Martin Par. sw14 34-10s-9e	30.0	13.4	6&7	....	....	....	....	....	20.2	....	....
Floodway, St. Mary Par., 16-16s-12e	600.0	189.0	6&7	....	....	....	....	....	195.5	....	....
Fordoche, Pointe Coupee Par., 28-6s-8e	40.0	6.7	[38]2	....	1.9	....	1.2	....	....	1.8	....
Henry, Vermilion Par., 21-13s-4e	737.5	300.0	[33]2	107.1	65.1	20.2	16.9	....	....	43.9	....
Paradis, St. Charles Par., 39-14s-20e	660.0	266.0	6-7 [38]2 6-7	77.2	96.5	30.7	25.0	....	....	52.4	....
Sea Robin, Vermilion Par., 21-13s-4e	900.0	277.0	6-7	....	....	....	....	....	533.4	....	....
Venice, Plaquemines Par., 25&26 21s-30e	65.0	25.0	[41]2	....	....	....	....	....	16.3	....	....
Texas Oil & Gas Corp.—Ruston, Lincoln Par., ne4 of nw4 12-19n-4n	30.0	30.3	3	....	....	....	....	....	26.1	....	....
Union Texas Petroleum—Cox Bay, Plaquemine Par., 5-18s-16e	20.0	8.9	1	....	2.9	1.0	1.1	....	....	2.8	....
Pointe-a-la-Hache, Plaquemine Par., 78-13s-14e	20.0	6.4	[17]2	....	0.8	0.3	0.3	....	....	1.0	....
Sligo, Bossier Par., 29-18n-11w	70.0	26.7	[17]2	....	9.4	2.5	3.3	....	....	8.4	....
Toca, St. Bernard Par., 56-14s-14e	160.0	89.0	[17]2	....	39.3	11.9	14.0	....	....	25.2	....
Warren Petroleum Co.—Krotz Springs, St. Landry Par., 22-6s-7e	NR	8.1	2	....	....	....	....	....	40.1	....	....
Mermentau, Acadia Par., n½-n½ 70-10s-2w	NR	19.8	1	....	....	....	....	....	32.1	....	....
Vermilion Par., s2 sw4 nw4 28-13s-2e	NR	66.9	7	....	....	....	....	....	88.2	....	....
Venice, Plaquemines Par., 25-21s-30e	NR	347.1	2	167.0	117.8	34.8	38.1	....	53.3	....	....
Total	**19,941.8**	**10,178.4**		**1,437.3**	**1,142.9**	**306.7**	**432.0**	**19.1**	**5,479.7**	**749.8**	**562.4**

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†Fractionation. (Figures in parenthesis do not represent primary production, and are not added in state totals).

MICHIGAN

Company, plant, location	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Amoco Production Co.—Kalkaska Co., 31-27n-7w	180.0	115.2	7	....	58.6	....	101.9	....	96.5	....	....
ANR Pipeline Co.—*Austin dehydration, Mecosta Co., 4-14n-9w	500.0	114.0	[28]5	....	....	....	....	....	....	....	[11]1.3
*Capac dehyd., St. Clair, 16-7n-13e	300.0	88.0	[11]1	....	....	....	....	....	....	....	....
*C. Charlton-1 sep., Otsego Co., 1-30n-1w	220.0	116.0	3	....	....	....	....	....	....	....	[11]14.8
*Coldwater dehyd., Isabella Co., 29-16n-6w	40.0	16.0	[11]1	....	....	....	....	....	....	....	....
*Croton dehyd., Newaygo Co., 29-12n-11w	50.0	16.0	[11]1	....	....	....	....	....	....	....	....
*Goodwell dehyd., Newaygo Co., 4-14n-11w	385.0	134.0	[28]5	....	....	....	....	....	....	....	[11]0.9
*Lincoln dehyd., St. Clair Co., 20-18n-5w	300.0	110.0	[28]5	....	....	....	....	....	....	....	[11]0.8
*Loreed, Osceola Co., 30-18n-10w	32.0	24.4	3	....	....	....	....	....	1.3	....	....
*Loreed dehyd., Osceola Co., 30-18n-10w	1,000.0	186.0	[11]1	....	....	....	....	....	....	....	....
*Muttonville dehyd., Macomb Co., 13-4n-14e	450.0	125.0	[11]1	....	....	....	....	....	....	....	....
*North Hamilton dehyd., Clare Co., 6-19n-3w	40.0	7.0	[11]1	....	....	....	....	....	....	....	....
*Norwich dehyd., Newaygo Co., 4-14n-11w	50.0	11.0	[11]1	....	....	....	....	....	....	....	....
*Orient dehyd., Osceola Co., 13-17n-7w	50.0	18.0	[11]1	....	....	....	....	....	....	....	....
*Reed City dehyd., Osceola Co., 30-18n-10w	300.0	80.0	[11]1	....	....	....	....	....	....	....	....
*South Chester-15 sep., Otsego Co., 15-29n-2w	270.0	157.0	3	....	....	....	....	....	....	....	[11]11.0
*Winfield dehyd., Montcalm Co., 7-12n-9w	100.0	37.0	[11]1	....	....	....	....	....	....	....	....
Lakeville Gas Associates.—Leonard, Oakland Co., Addison e¼-15-5n-11e	20.0	4.0	[2]2	....	....	....	....	....	5.5	....	....
Marathon Oil Co.—Scipio, Hillside Co., 10-5s-3w	38.0	3.8	2	....	22.5	....	....	....	....	20.8	....
Michigan Consolidated Gas Co.—Romeo, Macomb Co., 14-4n-12e	15.0	12.5	3	....	....	....	....	....	10.0	....	....

	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
Company, plant, location	Gas capacity	Gas throughput	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Mobil Oil Corp.—Aurelius, Ingham Co., 36-2n-2w	23.0	3.4	2	....	9.4	....	....	....	11.0	....	[9]1.1
Shell Western E&P Inc.—Kalkaska Co., 32-27n-7w	350.0	207.0	2&7	....	....	....	....	....	627.7	....	....
Sun Exploration & Production Co.—											
*Columbus III, Saint Clair Co., 3-5n-15e	7.4	6.1	3	....	....	....	....	....	5.0	....	....
Mentor, Oscoda Co.	9.7	5.0	...	....	....	....	....	....	3.5	....	....
Mt. Pleasant, Isabella Co., 2-14n-3w	3.0	0.4	3	....	....	....	....	....	0.6	....	
Norwich, Missaukee Co., 12-24n-5w	10.0	3.2	6	....	....	....	....	....	15.3	....	....
Williams, Midland Co., 35-15n-2e	1.5	0.7	3	....	....	....	....	....	1.6	....	....
Total	**4,744.6**	**1,600.7**		....	**90.5**	....	**101.9**	....	**778.0**	**20.8**	**29.9**
MISSISSIPPI											
Koch Hydrocarbon Co.—Harmony, Clarke Co., 26-2n-14e	30.0	5.3	3	....	6.3	....	4.8	....	....	8.1	....
Shell Western E&P Inc.—Goodwater, Clarke Co., 5-10n-8w	15.0	6.0	3	....	3.3	....	4.1	....	....	3.1	....
Tallahala Creek, Smith Co., 5-1n-9e	4.0	4.0	3	....	....	....	....	....	4.9	....	....
Thomasville, Rankin Co., 27-4n-3e	100.0	58.0	....	....	....	....	....	....	....	....	....
Southern Natural Gas Co.—*Muldon, Monroe Co., 27-15s-6e	750.0	282.0	[6]5	....	....	....	....	....	11.3	....	....
Total	**899.0**	**355.3**		....	**9.6**	....	**8.9**	....	**16.2**	**11.2**	....
MONTANA											
Coastal Oil & Gas Corp.—Stateline, Richland Co., 7 22n-59e	12.0	3.0	3	....	6.1	....	....	6.3	....	....	[11]0.9
Flying J Inc.—Glacier Co., 22-33n-5w	30.0	20.8	[3]2	....	9.7	....	7.8	....	7.3	....	....
Shell Western E&P Inc.—Cabin Creek, Fallon Co., 18-10n-58e	1.9	1.0	3	....	....	....	....	....	....	7.2	....
Little Beaver, Fallon Co., 8-4n-62e	0.4	0.3	3	....	1.2	....	....	1.4	....	....	....
South Pine, Wibaux Co., 10-11n-57e	1.2	1.0	4	....	....	....	....	....	5.5	....	....
True Oil Co.—Bob Rhodes, Richland Co., ne 4-25n-58e	4.0	0.8	3	....	....	....	....	....	4.1	....	....
Western Gas Processors—Baker, Fallon Co., sw4 sw4 6-7n-60e	2.5	2.0	3	....	10.7	3.9	....	7.4	4.6	2.4	....
Total	**52.0**	**28.9**		....	**27.7**	**3.9**	**7.8**	**15.1**	**21.5**	**9.6**	**0.9**
NEBRASKA											
Cities Service Oil and Gas Corp.—Kimball, Kimball Co., 10-12n-55w	1.5	0.7	3	....	....	....	....	....	3.8	....	....
Marathon Oil Co.—West Sidney, Cheyenne Co., 4-12n-50w	2.0	1.3	3	....	....	....	....	....	2.7	....	....
Total	**3.5**	**2.0**		....	....	....	....	....	**6.5**	....	....
NEW MEXICO											
Amoco Production Co.—*Empire Abo, Eddy Co., 3-18s-27e	42.0	40.3	7	77.8	46.5	....	21.0	....	....	21.6	....
Cabot Corp.—Hobbs, Lea Co., 28-18s-36e	60.5	0.9	7	....	....	....	....	....	5.7	....	....
Cities Service Oil and Gas Corp.—											
Bluitt, Roosevelt Co., 15-8s-36e	25.0	19.0	7	....	....	....	....	....	105.0	....	....
Burton Flats, Eddy Co., 14-20s-28e NMPM.	8.0	3.0	7	....	....	....	....	....	9.0	....	....
Conoco Inc.—Maljamar, Lea Co., sw se 21-17s-32e	50.0	20.0	7	42.5	36.6	5.2	12.2	....	....	9.7	[11]4.1
San Juan Co., 14-29n-11w	500.0	500.0	7	....	....	....	....	....	1,680.0	....	....
Davis, J.L.—Denton, Lea Co., 2-7-155-37e	12.0	6.0	7	....	....	....	....	....	42.0	....	....
El Paso Natural Gas Co.—Blanco, San Juan Co., n2-n2 14-29n-11w	558.0	204.5	[15]1	....	....	....	....	....	118.4	....	....
Chaco, San Juan Co., sw4 16-26n-12w	594.0	344.9	[15-16]2	....	....	....	....	....	500.0	....	....
Jal No. 3, Lea Co., nw4-sw4 33-24s-37e	225.0	37.2	[17]2	....	....	....	....	....	78.0	....	....
San Juan Co., 1-29n-15w	71.0	7.6	[15]1	....	....	....	....	....	6.4	....	....
Wingate, McKinley Co., 16&17-15n-17w	....	....	†	....	(310.1)	(77.7)	(146.8)	....	....	(170.5)	....
Marathon Oil Co.—Indian Basin, Eddy Co., 23-21s-23e	210.0	63.6	7	....	....	....	....	....	104.8	....	[11]11.0
Mesa Limited Partnership—South Blanco Creek, 6-7w-23n	6.0	1.5	3	....	....	....	....	....	8.0	....	....
Minerals Inc.—Hobbs, Lea Co., sw¼-sw¼-ne¼ 36-18s-36e	45.0	19.0	7	....	....	....	....	....	30.2	....	....
Kermac, Eddy Co., 4-21s-31e	6.0	2.5	6	....	....	....	....	....	1.2	....	....
Northern Natural Gas Co.—Hobbs, Lea Co., 6-19s-37e	220.0	75.1	[36]2	....	....	....	....	....	127.1	....	....
Phillips Petroleum Co.—Artesia, Eddy Co., s2 se4 7-18s-28e	43.0	NR	7	....	....	....	....	....	....	....	....
Eunice, Lea Co., ne4 3-22s-37e	80.0	NR	7	....	....	....	....	....	....	....	....
Lee, Lea Co., sw4 se4 30 nw4-ne4-31-17s-35e	35.0	NR	7	....	....	....	....	....	....	....	....
Lusk, Lea Co., nw4 ne4 19-19s-32e	60.0	NR	2	....	....	....	....	....	....	....	....
Sunterra Gas Processing Co.—Kutz No. 1, San Juan Co., nw4 13-28n-11w	100.0	78.6	2	....	....	....	....	....	135.6	....	....
Kutz No. 2, San Juan Co., nw4 13-28n-11w	85.0	12.3	7	....	....	....	....	....	26.4	....	....
Lybrook, Rio Arriba Co., nw¼ 14-23n-7w	85.0	41.7	7	....	....	....	....	....	69.9	....	....
Texaco—Buckeye, Lea Co., se¼ of se¼ 36-17s&18s-34e, I mi se of Buckeye	25.0	6.2	6	....	....	....	....	....	72.8	....	....
Eunice No. 1, Lea Co., 27-22s-37e	105.0	72.5	7	176.7	112.9	11.4	33.8	....	....	48.9	[11]2.0
Warren Petroleum Co.—Eunice, Lea Co., ne4 3-22s-37e	NR	50.0	7	....	....	....	....	....	253.0	....	....
Monument, Lea Co., sw4 36-19s-36e	NR	59.0	7	....	....	....	....	....	245.0	....	....
Saunders, Lea Co., 34-14s-33e	NR	27.0	6	....	....	....	....	....	201.0	....	....
Vada, Lea Co., sw2-sw4-nw4 23-10s-33e	NR	12.0	6	....	....	....	....	....	73.0	....	....
Total	**3,435.4**	**1,878.8**		**297.0**	**196.0**	**16.6**	**67.0**	....	**3,892.5**	**80.2**	**17.1**

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†Fractionation. (Figures in parenthesis do not represent primary production, and are not added in state totals).

NORTH DAKOTA

Company, plant, location	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
	Gas capacity	Gas throughput	Process/condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Cenex—Coyote Creek, Bowman Co., 27-131n-104w	3.0	0.7	[17]2	....	1.1	....	3.4	....	....	....	....
Cities Service Oil and Gas Corp.—Lignite, Burke Co., nw4 7-162n-91w	11.0	6.9	2	....	13.0	....	7.0	....	....	7.0	....
Kerr-McGee Corp.—Boxcar Butte, McKenzie Co., 51-148n-102w	6.0	NR	3	....	6.6	....	4.0	....	2.3	....	....
Koch Hydrocarbon Co.—Grasslands, McKenzie Co., 36-148n-105w	70.0	51.1	7	....	69.7	....	48.3	....	....	53.4	....
Trenton, Williams Co., 10-153n-102w	28.0	18.4	...	....	....	....	....	....	75.7	....	....
Phillips Petroleum Co.—Tioga, Williams Co., 26-157n-95w	105.0	NR	2	....	....	....	....	....	....	....	....
True Oil Co.—Red Wing Creek, McKenzie Co., ne 27-148n-101w	10.0	1.3	3	....	....	....	....	....	10.2	....	....
Warren Petroleum Co.—Little Knife, Dunn Co., 16-141n-98w	NR	31.0	7	....	62.6	....	....	....	60.3	....	....
Western Gas Processors Ltd.—Alexander, McKenzie Co., e½ sw¼ sw¼ 18-152n-101w	6.0	4.0	3	....	....	....	....	....	....	....	[11]2.6
Teddy Roosevelt, Billings Co., nw4-ne4 16-142n-99w	65.0	44.0	2&7	....	39.2	....	32.2	....	....	35.6	[11]10.3
Temple, Williams Co., Lot 4, 30-159n-95w	4.0	4.0	3	....	....	....	....	....	13.3	....	[11]0.7
Total	**346.7**	**250.2**		....	**192.2**	....	**94.9**	....	**161.8**	**96.0**	**13.6**

OKLAHOMA

Company, plant, location	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
	Gas capacity	Gas throughput	Process/condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Amoco Production Co.—Elmwood, Beaver Co., 24-2n-24ecm	80.0	13.4	[36]2	....	....	....	....	....	29.3	....	....
Hitchcock-Okeene, Blaine Co., 13-17n-11w	55.0	38.9	7	....	....	....	....	....	82.6	....	[11]1.3
Mooreland, Woodward Co., 30-23n-18w	145.0	46.5	7	....	....	....	....	....	107.3	....	[11]4.7
North Okarche, Kingfisher Co., 8-15n-17w	25.0	2.1	[28]5	....	....	....	....	....	....	<0.1	....
Star Lacey, Blaine Co., 2-19n-10w	20.0	1.2	[40]2	....	....	....	....	....	2.1	....	....
Anadarko Production Co.—Beaver Co., se 25-6n-21ecm	10.0	3.2	7	....	....	....	....	....	4.4	....	....
North Richland Center, Texas Co., 33-6n-12ecm	25.0	8.7	[41]2	....	9.8	....	....	....	8.1	....	....
Arco Oil & Gas Co.—Blackwell, Kay Co., 9-27n-1w	0.5	0.2	3	<0.1	0.1	<0.1	0.1	....	....	0.2	....
Covington, Garfield Co., w2-sw4 19-22n-3w	15.0	12.0	7	15.6	17.6	2.5	7.0	....	....	8.9	[11]0.2
Drumright, Creek Co., nw4 sw4 28-18n-7e	15.0	6.0	[17]1	....	12.0	1.9	6.0	....	....	9.8	[11]0.6
Mannford, Creek Co., w ne 30-18n-9e	10.0	2.1	3	0.5	1.9	0.3	0.9	....	....	0.9	....
Northwest Stillwater, Noble Co., n2 nw-ne ne 25-20n-1e	3.0	3.1	3	1.4	2.5	0.4	1.2	....	....	1.0	[11]0.2
Seminole Co., sw4-ne4 10-8n-6e	20.0	9.1	1	3.0	14.4	1.7	5.8	....	....	7.8	[11]1.0
Southeast Flynn, Garfield Co., se-se 8-20n-5w	12.0	3.9	3	1.8	2.3	0.4	1.1	....	....	1.4	[11]0.1
Tecumseh, Pottawatomi Co., sw¼ 36-9n-3e	5.0	1.6	3	0.9	2.8	0.5	1.5	....	....	1.8	....
Arkla Inc.—Elk City, Beckham Co., 2-10n-21w	10.0	0.4	[27]5	....	....	....	....	....	....	<0.1	....
Beard Oil Co.—Bentley, Payne Co., 22-18n-1e	1.0	0.4	3	....	....	....	....	....	0.3	....	....
*Choctaw, Oklahoma Co., 23-12n-1w	3.0	1.0	3	....	....	....	....	....	2.3	....	....
Cabot Corp.—Beaver Co., 25-5n-23ecm	20.0	7.6	7	....	....	....	....	....	22.4	....	....
Champlin Petroleum Co.—Enid, Garfield Co., 34-23n-6w	35.0	19.7	[17]2	....	....	....	....	....	75.7	....	....
Peavine, Logan Co., 35-15n-2w	12.0	7.1	6	....	....	....	....	....	32.4	....	....
West Edmond, Logan Co., 21-4n-15w	10.0	8.9	6	....	....	....	....	....	44.1	....	....
Cities Service Oil and Gas Corp.—Ambrose, Kay Co., sw4 9-27n-1w	400.0	178.0	2	....	76.0	16.0	36.0	....	....	29.0	[5]8.6
Garrett, Kay Co., ne4-ne4 34-27n-1e	12.0	5.0	4	....	....	....	....	....	14.4	....	....
Murdock, Texas Co., 32-5n-16ecm	40.0	6.7	7	....	....	....	....	....	16.0	....	....
Rodman, Garfield Co., 27-20n-8w	50.0	37.0	7	....	....	....	....	....	118.0	....	....
CNG Producing Co.—Southwest Davis, 15-15s-1e	2.0	0.7	3	....	....	....	....	....	4.2	....	....
Coastal Oil & Gas Corp.—Custer Co., ne4 5-13n-17w	200.0	143.0	7	....	....	....	....	....	197.1	....	....
Conoco Inc.—Cashion, Kingfisher Co., ne ne - 9-15n-5w	30.0	25.2	7	21.3	29.7	4.0	11.8	....	....	13.6	[11]1.1
Clinton, Custer Co., sw 26-12n-16w	75.0	61.6	7	56.7	34.6	6.4	8.2	....	....	10.2	[11]<0.1
Hennessey, Kingfisher Co., nw nw 36-19n-7w	30.0	29.8	7	21.5	19.4	2.5	6.8	....	....	7.0	[11]0.7
Mustang, Grady Co., 30-10n-5w	30.0	14.2	7	8.4	6.5	1.0	2.5	....	....	3.2	[11]<0.1
Damson Gas Processing Corp.—Hooker, Texas Co., 8-4n-17e	70.0	32.0	7	....	....	....	....	....	95.0	....	....
Deisenroth Gas Products Inc.—Okemah, Okfuskee Co., 23-11n-9e	1.0	0.8	[20]1	....	....	....	....	....	3.0	....	....
El Paso Natural Gas Co.—*Beaver Co., se4-ne4 18-3n-26e	40.0	4.1	3	....	....	....	....	....	4.5	....	....
Enogex Production Corp.—Calumet, Canadian Co., ne4 28-14n-9w	250.0	103.0	[17]2	....	50.0	....	....	¶40.0	....	....	....
Dibble, McClain Co., 35-7n-4w	3.0	1.8	3	....	....	....	....	....	5.0	....	....
Edmond, Okla. Co., 32-14n-4w	15.0	13.5	7	....	....	....	....	....	42.0	....	....
Henryetta, Okmulgee Co., 33-13n-12e	10.0	0.9	3	....	....	....	....	....	12.0	....	....
Enserch Processing Partners Ltd.—Wallville, Garvin Co., 27-4n-3w	6.0	2.3	2	....	....	....	....	....	2.8	....	....
Exxon Co.—Camargo, Dewey Co., 10-18n-19w	15.0	7.3	[17]2	....	....	....	....	....	15.4	....	....
Dover-Hennessey, Kingfisher Co., 1-18n-7w	80.0	49.0	7	....	....	....	....	....	223.0	....	....
Gulf Energy Gathering & Processing—Antioch, Garvin Co., 17-3n-2w	10.0	3.9	3	....	....	....	....	11.4	....	....	....
Pauls Valley, Garvin Co., 12-3n-1w	0.7	0.6	3	....	....	....	....	1.6	....	....	....
West Guthrie, Logan Co., 30-15n-2w	10.0	13.6	3	....	....	....	....	31.7	....	....	....
Kerr-McGee Corp.—Milfay, Creek Co., 21-15n-7e	12.0	NR	2	....	....	....	....	....	17.4	....	....
Koch Hydrocarbon Co.—Fitts, Pontotoc Co., 30-2n-7e	12.0	1.3	3	....	1.5	....	....	....	5.0	....	....

Company, plant, location	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Ladd Petroleum Corp.—Beaver Co., 30 4n-20ecm	40.0	30.9	7	....	....	....	....	....	63.8	....	....
McMoRan Oil & Gas Co.—Tyrone, Texas Co., sw¼ 19-6n-19 ecm	36.0	21.5	7	....	....	....	....	....	52.5	....	....
Mesa Limited Partnership—Binger, Caddo Co., 26-10n-11w	15.0	7.2	7	....	....	....	....	....	29.7	....	....
Madill, Marshall Co., 32-7e-5s	25.0	9.9	[1]2	....	15.3	1.4	5.1	....	....	4.7	....
Ringwood, Major Co., 11-22n-10w	80.0	42.8	[1]2&7	....	....	....	....	....	123.0	....	....
Mid-America Gas Line Corp.—Empire, Pawnee Co., 34-20n-7e	5.0	2.3	3	0.7	1.8	0.4	1.2	5.6	....	1.5	....
HJD, Pawnee Co., 8-20n-8e	6.0	2.1	3	1.0	2.5	0.5	1.6	7.8	....	2.1	....
Liberty, Creek Co., sw¼ nw¼ 7-17n-9e	3.0	1.1	3	0.5	1.3	0.3	0.7	3.3	....	0.5	....
Mobil Oil Corp.—Chitwood, Grady Co., 34-5n-6w	90.0	52.1	7	....	....	....	....	....	156.0	....	[9]6.0
NE Trail, Dewey Co., 1-17n-18w	34.0	13.7	2	....	8.8	....	....	....	28.9	....	[9]1.7
Postle Hough, Texas Co., 13-5n-13ecm	18.5	2.3	2	....	....	....	....	....	12.5	....	[9]0.4
*Putnam-Oswego, Dewey Co., 35-16n-16w	50.0	37.8	7	....	....	....	....	....	53.2	....	[9]0.5
Seiling, Woodward Co., 32-20n-17w	20.0	1.2	3	(All products fractionated at NE Trail)							
Sholem Alechem, Stephens Co., 2-1s-4w	70.0	39.7	7	....	1.0	....	....	....	185.6	....	[9]0.5
West Putnam, Dewey Co., 9-17n-17w	11.0	1.3	3	(All products fractionated at NE Trail)							
Oklahoma Gas Pipeline Co.—Tyrone, Texas Co., sw¼ 11-6n-18e	60.0	35.0	7	9.8	19.0	4.1	9.3	....	....	11.7	....
Phillips Petroleum Co.—Aline, Alfalfa Co., 7-23n-11w	45.0	NR	2	....	....	....	....	....	....	....	....
Bradley, Garvin Co., ne4 nw4 18-4n-4w	140.0	NR	1	....	....	....	....	....	....	....	....
Cimarron, Woodward Co., e2 ne4 27-20n-17w	56.0	NR	7	....	....	....	....	....	....	....	....
Creek, Tulsa Co., s2 sw4 nw4 7-17n-13e	25.0	NR	7	....	....	....	....	....	....	....	....
Fox, Carter, Co., 28-2s-3w	70.0	NR	7	....	....	....	....	....	....	....	....
Kingfisher Co., nw4 sw4 9-15n-5w	175.0	NR	7	....	....	....	....	....	....	....	....
Lucien, Noble Co., 18-20n-2w	22.0	NR	3&7	....	....	....	....	....	....	....	....
Norge, Grady Co., ne4 3-6n-8w	27.0	NR	3	....	....	....	....	....	....	....	....
Okarche, Kingfisher Co., se4 ne4 31-15n-8w	150.0	NR	7	....	....	....	....	....	....	....	....
Osage Co., se4 32-26n-7e	15.0	NR	3	....	....	....	....	....	....	....	....
Seiling, Dewey Co.	75.0	NR	7	....	....	....	....	....	....	....	....
Sooner No. 1, Major Co., se4 se4 17-20n-9w	12.0	NR	3	....	....	....	....	....	....	....	....
Shell Western E&P Inc.—Elk City, Beckham Co., 15-10n-21w	4.5	2.0	3	1.5	3.2	....	....	6.1	....	....	....
Standard Oil Production Co.—Crescent, Logan Co., nw 34-17n-4w	45.0	33.0	6	....	....	....	....	168.0	....	....	....
*Elmore, Garvin Co., 17-1n-2w	30.0	30.0	7	....	6.5	....	6.5	....	....	11.0	[5]45.0
Marshall, Garfield Co., nw 24-20n-4w	15.0	10.0	7	....	....	....	....	50.0	....	....	....
Sun Exploration & Production Co.—Carney, Lincoln Co., 12-15n-2e	15.0	18.8	7	....	....	....	....	....	67.4	....	....
Goldsby Central, McClain Co., 3-7n-3w	65.0	44.0	7	....	....	....	....	....	194.7	....	....
Laverne, Harper Co., 20-26n-25w	200.0	74.5	7	....	40.4	9.9	20.4	....	....	25.7	[5]119.2 [11]5.7
Newcastle, Grady Co., 14-9n-5w	NR	5.1	[17]2	....	4.5	....	....	....	4.1	....	....
Wakita, Grant Co., 5-27n-7w	15.0	14.3	[17]2	....	....	....	....	....	35.8	....	[11]1.5
Texaco—Camrick, Beaver Co., 31-1n-20 ecm	14.0	1.1	7	....	....	....	....	....	5.3	....	....
*East Velma Middle Block, Stephens Co., 1-2s-4w	30.0	18.4	[17]2	....	....	....	....	....	....	....	....
Enville, Love Co., 7-7s-3e	15.0	3.4	7	....	....	....	....	....	11.0	....	....
Kellyville, Creek Co., ne 27-17n-10e	15.0	0.1	6	....	....	....	....	....	....	....	....
Maysville, Garvin Co., 18-4n-2w	114.0	102.4	7	188.8	130.8	8.8	43.2	....	....	50.8	[8]2.2
Velma, Stephens Co., 23-Is-5w	100.0	79.4	7	....	....	....	....	....	264.8	....	....
Texas Oil & Gas Corp.—Antelope Hills, Roger Mills Co., 30-16n-24w	50.0	29.0	7	....	....	....	....	....	58.8	....	[11]0.6
Beaver Co., 9-1n-27e	75.0	13.4	7	....	....	....	....	....	22.0	....	[11]0.3
Cimarron, Blaine Co., nw4 24-18n-13w	90.0	23.1	7	....	....	....	....	....	47.6	....	[11]0.5
Custer Co., sw4 nw4 34-14n-16w	115.0	57.1	[17]2&7	....	....	....	....	....	120.4	....	[11]0.3
El Reno, Canadian Co., nw4 sw4 33-14n-7w	75.0	35.5	7	....	....	....	....	....	79.0	....	[11]4.1
Jeffries, Major Co., sw4 nw4 19-23n-12w	20.0	0.6	[17]2	....	....	....	....	....	1.1	....	....
Stephens So., 14-1s-5w	25.0	0.2	7	....	....	....	....	....	0.3	....	....
Watonga, Kingfisher Co., w2 se4 35-15n-9w	40.0	1.7	7	....	....	....	....	....	2.6	....	[11]0.4
Woodward Co., sw4 nw4 29-23n-21w	75.0	24.6	7	....	....	....	....	....	43.5	....	[11]1.4
Union Texas Petroleum Corp.—Chaney Dell, Major Co., 35-23n-10w	130.0	95.9	[17]2&7	91.1	95.8	15.1	35.7	....	....	60.6	....
Chester, Woodward Co., 2-20n-17w	25.0	10.3	6-7	9.1	7.2	1.4	3.2	....	....	3.9	....
Lamont, Grant Co., 19-26n-3w	37.0	23.9	[17]2&7	55.2	42.4	5.6	15.4	....	....	19.4	....
Unocal—Caddo, Carter Co., 23-36-1e	10.0	3.4	3	....	4.3	....	....	....	4.0	....	[11]0.2
Valero Hydrocarbons Co.—Elk City, Beckham Co., 15-10n-21w	85.0	68.3	7	18.5	26.1	5.4	10.1	....	10.0	....	....
Tecumseh, Pottawatomie Co., ne4 29-10n-3e	14.1	13.6	3	10.4	15.3	2.1	6.8	....	5.7	....	....
Warren Petroleum Co.—Kingfisher Co., 11-15n-9w	NR	7.1	7	....	....	....	....	....	16.6	....	....
Knox, Grady Co., 33-3n-5w	NR	15.9	2	....	4.1	....	....	....	12.9	....	[11]8.1
Leedey, Roger Mills Co., 32-16n-21w	NR	24.3	7	....	....	....	....	....	80.6	....	....
Mocane, Beaver Co., 18-5n-25e ecm	NR	23.6	2	....	....	....	....	....	53.8	....	
Total	**4,949.0**	**2,791.7**		**517.7**	**711.4**	**92.7**	**248.1**	**325.5**	**3,033.0**	**286.7**	**217.1**

¶Isobutane and C_4+.

TEXAS

Adobe Resources Corp.—Sale Ranch, Martin Co., 23-37-1n	16.0	11.4	[17]2	....	....	....	....	....	75.4	....	....
Amoco Gas Co.—Texas City, Galveston Co., 1.814 acre tract in John Grant A-72	60.0	47.6	7	....	....	....	....	....	13.8	....	[5]17.1
Amoco Production Co.—Anton-Irish, Hale Co., 14-DT HE&WT RR	12.0	NR	3	....	....	....	....	....	16.1	....	....
Edgewood, Van Zandt Co., 2 Roberts A-702	60.0	37.6	[36]2	....	16.8	....	19.2	....	....	11.2	[11]53.5
Hastings, Brazoria Co., 1-ACH-DA-416	32.0	32.0	7	....	....	....	....	....	16.9	....	[5]8.8

Company, plant, location	MMcfd Gas capacity	MMcfd Gas throughput	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Mallett CO_2 removal, Hockley Co., Labors 16, 17 League 49 Scurry Co. School Land	100.0	16.6	3	....	....	....	....	....	....	17.5	....
Midland Farms, Andrews Co., 842-T-T-N G&MMB&A	15.0	25.1	7	....	....	....	....	....	140.0	....	[10]1.9
Monahans, Winkler Co., 24-10 PSL	5.0	4.0	3	....	....	....	....	....	9.0	....	....
North Cowden, Ector Co., 34-5-43-1M T&P RR	25.0	17.4	7	....	48.0	....	57.8	....	....	....	[5]40.8 [10]0.2
Old Ocean, Brazoria Co., Charles Breen League A-46	175.0	122.0	7	72.0	40.4	11.1	10.6	....	....	44.0	....
Slaughter, Hockley Co., 14-15-59 Edwards & Scurry CSL	57.0	50.2	7	....	109.0	....	88.7	....	....	79.7	[5]213.3
South Fullerton, Andrews Co., 8-A 48 PSL	10.0	9.6	7	....	....	....	....	....	99.0	....	[10]0.8
West Yantis, Wood Co., 3 Oscar Engledon A-181	50.0	8.8	3	....	....	....	....	....	....	....	[11]41.7
Anchor Gasoline Corp.—Tabasco, Hidalgo Co., nw corner of Tract 322, Las Ejidas de Reynosa Vieja Grant	67.0	NR	1	....	....	....	....	5.0	....	0.8	....
Arco Oil and Gas Co.—*Block 31, Crane Co., 33-31 Univ. Lands	265.0	307.5	3&7	210.6	156.9	....	87.1	....	....	73.0	....
Carthage	...	...	3	....	1.2	....	1.5	....	....	2.4	....
*Crane, Upton Co., 128-D CCS&RR Co.	15.0	6.8	3	7.5	7.8	1.2	3.6	....	....	4.2	[11]0.1
Crittenden, Winkler Co., 24-C23-PSL	50.0	9.8	7	10.4	4.9	1.1	1.4	....	....	2.6	....
El Dorado, Schleicher Co., 81-TT-TC RR	15.0	14.4	7	32.4	25.4	4.3	9.6	....	....	8.4	[11]4.5
Fashing, Atascosa & Karnes Co., 131 Wm. Smith	12.0	4.5	[17]5	....	0.3	....	0.4	....	....	0.9	....
Hull, Liberty Co., Wm. Smith A-342	18.0	3.6	[24]2	....	0.9	....	0.7	....	....	1.0	[11]0.1
Longview, Gregg Co., J. Moseley	35.0	9.2	6	46.1	62.5	....	42.6	....	....	32.8	[11]1.1
Midland Co., 17-40-4s T&PRR	12.0	7.4	3	5.8	7.4	1.2	3.6	....	....	4.6	[11]<0.1
Nueces River, Live Oak Co., Cameron CSL 32-A-34	90.0	32.7	3	....	22.5	18.1	....	....	....	14.6	....
Price, Rusk Co., George W. Brooks A-4	15.0	5.2	[15]1	0.9	3.5	....	4.4	....	....	6.0	[11]0.4
Refugio Co., 48&48A Coleman Fulton Pasture Land	6.5	1.4	3	....	....	....	....	....	....	....	[11]0.2
Silsbee, Hardin Co., George W. Brooks A-4	15.0	3.8	7	17.1	18.4	4.5	5.4	....	....	5.3	<[11]0.1
Taft, San Patricio Co., Coleman Fulton Pasture Land	40.0	14.6	[24]2	....	3.6	....	3.3	....	....	3.6	[11]0.5
Arkla Inc.—Jefferson, Marion Co., Heirs of John Hanks A-188	3.0	0.6	3	....	....	....	....	....	....	0.2	....
Waskom, Harrison Co., J. Blair	125.0	59.7	[15]1	....	9.5	4.5	6.6	....	....	16.7	....
Willow Springs, Gregg Co., P. P. Rains	20.0	4.5	[27]5	....	....	....	....	....	....	0.8	....
Associated Natural Gas Inc.—Strawn, Tom Green Co.	5.0	2.5	6	....	....	....	....	....	17.5	....	....
BHP Petroleum—Diamond M, Scurry Co., se¼ 182-97 H&TC	18.0	13.0	6	43.2	58.2	8.0	23.4	....	....	22.6	[11]0.9
Black Hawk Gasoline Corp.—Jack Co., R. Stanton, A-1329	1.5	0.7	3&4	....	....	....	....	2.0	....	....	....
Breckenridge Gasoline Co.— Lodi, Cass Co., Wm. R. Meyer A-166	7.0	3.2	[17]1	....	....	....	....	....	7.3	....	....
Bruin Petroleum Inc.—Clarkson. Sutton Co.	20.0	18.0	7	....	....	....	....	....	43.0	....	....
Hainesville, Wood Co.	4.0	4.0	3	....	....	....	....	....	10.0	....	....
Trinidad, Henderson Co.	12.0	1.0	3	....	....	....	....	....	4.0	....	....
Urbana, San Jacinto Co.	4.0	1.0	3	....	....	....	....	....	2.0	....	....
Cabot Corp.—Arrington, Hemphill Co., 62-A-2 H&GNRR	40.0	14.7	2	....	....	....	....	....	18.6	....	....
Carson Co., 4-5-I&GN	20.0	14.6	7	....	....	....	....	....	49.6	....	....
East Goldsmith, Ector Co., 44-34, 1n,T&PRR	35.0	10.3	5&7	....	....	....	....	....	18.8	....	....
Estes, Ward Co., 3-16 Univ. Land	11.5	10.0	7	....	....	....	....	....	53.2	....	....
Gray Co., 152-3 I&GN	20.0	6.9	7	....	....	....	....	....	36.3	....	....
Kingsmill, Gray Co., 152-3-I&GN	24.5	18.8	7	....	....	....	....	....	104.9	....	....
Levelland, Hockley Co., 14-43, Rains County School Land	15.0	4.6	7	....	....	....	....	....	6.0	....	....
Pampa, Gray Co., 96 B-2 H&GN	23.0	0.7	2	....	....	....	....	....	2.7	....	....
Turkey Creek, Potter Co., 36-M20-G&M	40.0	10.5	2	....	....	....	....	....	26.5	....	....
Walton, Winkler Co., 11-26 PSL	33.5	27.7	7	....	....	....	....	....	93.7	....	....
Champlin Petroleum Co.—Bryan, Brazos	35.0	21.2	6	....	....	....	....	....	90.1	....	....
Conger, Glasscock Co.	6.0	2.3	3	....	....	....	....	....	1.7	....	....
Conroe, Montgomery Co.	60.0	58.2	7	....	....	....	....	....	81.2	....	....
East Texas, Panola Co.	380.0	281.0	7	240.6	103.1	....	0.3	....	203.8	91.0	....
Gulf Plains, Nueces	85.0	60.2	7	64.7	28.6	....	20.2	....	....	45.3	....
Lyons 1 & 2, Burleson Co.	35.0	14.8	3	....	....	....	....	....	62.5	....	....
Tunis, Burleson Co.	15.0	7.8	3	....	....	....	....	....	42.1	....	....
Chevron USA Inc.—Kermit, Winkler Co., 12-B3 PSL	50.0	9.0	2	....	5.8	....	2.6	....	....	5.2	....
Sherman, Grayson Co., A-121 Uriah Burns	33.0	16.0	2	....	10.0	....	....	10.7	....	5.3	....
North Snyder, Scurry Co., 440-97 H&TC RR	46.0	26.0	3	....	....	....	19.4	....	87.5	26.8	[5]36.9
Cities Service Oil and Gas Corp.—Chico, Wise Co., 3 GH&HRR A-384	100.0	84.0	7	....	....	....	....	....	491.0	....	[11]7.0
East Texas, Gregg Co., William Castleberry A-38	27.0	22.0	7	....	....	....	....	85.0	....	....	[5]116.0
Flatrock Creek, Young Co., 6 acres, M. Case A-1402, (File 8 NGL 2630)	10.0	9.0	2	....	....	....	....	....	24.0	....	....
Graham, Young Co., 4 acres e 53⅓ acres subdiv 15 TE&L A-3412 (File 10-NGL 2631)	7.0	3.6	3	....	....	....	....	....	10.0	....	....
Gulf Coast fractionation, Chambers Co., Henry Griffin, League A-12	....	....	†	(861.0)	(770.0)	(162.0)	(352.0)	....	....	(358.0)	....
Lefors, Gray Co., 2-1-ACH&B	12.0	8.9	7	....	....	....	....	93.0	....	....	....
Markley, Archer Co., 2 acres in A. Rohns A-240 (File 10 NGL 2634)	2.0	0.5	3	....	....	....	....	....	2.5	....	....
Mont Belvieu fractionation, Chambers Co., Henry Griffin, League A-12	....	....	†	(527.0)	(473.0)	(110.0)	(267 0)	....	....	(188.0)	....
Myrtle Springs, Van Zandt Co., J. Salingua A-765	30.0	16.0	2	....	17.0	....	17.0	....	....	11.0	[11]56.0

Company, plant, location	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
	Gas capacity	Gas throughput	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
*Roberts Ranch, Midland Co., 16-41-3s T&PRR	85.0	67.0	7	....	....	....	....	....	186.0	....	....
Stonewall Co., Elijah Boren A-831	12.0	5.8	1	....	17.5	....	8.8	....	....	9.5	....
Conoco Inc.—Chittim, Maurice Co., 35-6	5.0	1.7	3	....	4.4	....	5.7	....	....	3.7	....
Hamlin, Fisher Co., 9-R-26	14.0	10.0	7	17.3	18.2	2.8	7.0	....	....	7.1	[11]0.1
Ramsey, Reeves Co., nw½ 36-58-1	10.0	7.7	6	....	10.0	....	6.3	....	....	6.2	....
Damson Gas Processing Corp.—Brazos River, Young Co., J. Garrett	....	....	†	(0.5)	(8.0)	....	(4.0)	....	....	(4.0)	....
Caddo, Stephens Co., 77 T&P RR 5	1.0	0.8	4	....	....	....	....	....	4.0	....	....
Canadian, Hemphill Co.	3.0	0.8	3	....	....	....	....	....	1.8	....	....
Cargray, Carson Co., 46-4 I&GN	30.0	14.0	7	25.0	20.0	....	....	....	32.0	....	....
Ibex, Shackelford Co., nw¼ 28 BAL	10.0	5.0	[8]1	....	....	....	....	....	....	....	....
Nueces, Tract 18, Map 153	30.0	6.0	3	....	....	....	....	....	....	....	....
South Bend, Young Co., J. Garrett	10.0	6.0	[8]1	....	10.0	....	3.5	....	....	6.0	....
Sterling Co., 10-22 H&TC	30.0	26.0	7	....	....	....	....	....	130.0	....	....
Texon, Reagan Co., 12-2 Univ. Land	3.0	2.0	4	....	....	....	....	....	....	....	....
Woodlawn, Harrison Co.	100.0	20.0	[17]1	....	....	....	....	....	35.0	....	....
Davis Gas Processing Inc.—Big Lake, Reagan Co., 8 miles e of Big Lake	12.0	9.5	[17-24]2	....	....	....	....	....	48.0	....	....
Bowie, Montague Co., 3 miles ne of Bowie	8.0	3.5	3	....	7.0	....	....	....	8.0	....	....
Concho, Concho Co., 4 miles s of Paint Rock	10.0	3.5	[17-24]2	....	3.5	....	....	....	3.5	....	....
DeWees, Wilson Co., 10 miles sw of Floresville	2.0	0.2	3	....	....	....	....	....	1.0	....	....
Irion (Rocker B-2), Irion Co., 8 miles n of Barnhart	16.0	8.5	[17-24]2	....	....	....	....	....	48.0	....	....
Kosciusko, Wilson Co., 1 mile n of Kosciusko	8.0	3.0	3	....	....	....	....	....	5.0	....	....
Neleh, 5 miles sw of McCamey	6.0	3.5	2	(Gas processed at Shell's Tippett plant)							
Ozona, Crockett Co., 13 miles sw of Ozona	5.0	2.0	3	....	....	....	....	....	4.0	....	....
Stiles, Reagan Co., 5 miles nw of Texon	8.0	3.5	[17-24]2	....	....	....	....	....	22.0	....	....
Davis, J.L.—Claytonville, Fisher Co., 211-3 H&TC RR, 12 mi n of Roscoe	12.0	5.0	[17-24]2	....	....	....	....	....	40.0	....	....
Peach Creek, Lavaca Co., A-32	15.0	4.0	7	....	....	....	....	....	10.0	....	....
Pearsall, Frio Co., 1-A-307 Henry Castro	8.0	4.0	3	....	....	....	....	....	12.0	....	....
Diamond Shamrock Corp.—McKee, Moore Co., 399-44 H&TC	375.0	257.6	[17]2&7	....	244.7	47.1	115.1	....	110.5	....	[5]390.8
Double U Oil Co.-Bowman B, I&GN RR 55 A-275 Block 2, Dimmit Co.	1.0	0.4	3	....	....	....	....	....	0.5	....	....
Eagle Petroleum Corp.—Eagle-Thriftway, Young Co.	1.5	0.5	3	....	....	....	....	....	2.0	....	....
Holliday No. 2, Archer Co.	1.5	0.5	3	....	....	....	....	....	2.5	....	....
El Paso Hydrocarbons Co.—Benedum, Upton Co., w2 46 Y MK&T RR	90.0	80.5	7	....	....	....	....	....	....	364.7	....
Foster, Ector Co., sw18-42-2s T&PRR	20.0	14.0	7	47.8	43.4	....	22.6	....	....	19.0	....
Santa Rosa, Pecos Co., s2 105 8 H&GN RR	20.0	18.0	7	....	....	....	....	....	73.2	....	....
El Paso Natural Gas Co.—Midkiff, Reagan Co., nw4 n2 sw4-22 T&PRR 37-5-5	168.0	67.4	[17]1	78.5	160.7	....	70.6	....	....	63.9	....
Wilshire, Upton Co., e2 ne4 ne4 & ne4 se4 ne4 135E CCSD & RGNG RR	30.0	20.7	4	....	....	....	....	....	2.4	....	....
Endevco Natural Gas Co.—Bear Wallow, Brazoria Co., Oliver Jones A-78	30.0	26.0	7	....	....	....	....	....	56.0	....	....
Cheyenne, Winkler Co., 15-L23 PSL	20.0	11.0	7	....	....	....	....	....	20.0	....	....
Fandango and Gun Point plants	130.0	100.0	[18]1	....	....	....	....	....	....	....	....
Iola, Grimes Co., RH Dunham A-184	30.0	24.0	7	....	....	....	....	....	75.0	....	....
Enron Gas Processing Co.—DuBose, Gonzales	35.0	5.0	[19]1	....	....	....	....	....	....	....	[11]0.2
Encinal, Webb Co.	35.0	26.0	7	....	9.3	....	7.6	....	....	5.7	....
Gregory, San Patricio Co., Geranimo Valdez A-269	70.0	40.0	[17-24]2	....	22.8	....	21.0	....	....	8.5	[11]0.6
Imperial, Crane Co., 20&21 1 H&TC RR-1	18.0	18.0	7	....	....	....	....	....	48.6	....	[11]0.5
Lipan, Hood Co., J.R. Anderson A-11	15.0	13.9	7	....	....	....	....	....	28.4	....	....
McMullen Co.	15.0	8.0	3	....	13.6	....	10.0	....	....	6.3	....
Martin Co. No. 1, 31-37-2n TYP RR	10.0	9.0	3	....	....	....	....	....	48.1	....	....
Martin Co. No. 2 4-HA	5.0	3.0	3	....	....	....	....	....	17.9	....	....
Middle Concho, sw4 90-14 H&TC RR Co.	10.0	2.9	6	....	....	....	....	....	13.0	....	....
Robstown, Nueces Co., Mathis Garcia A-116	80.0	64.0	[17-24]2	8.2	17.1	....	14.3	....	....	8.4	[11]0.3
Seven Oaks, Polk Co.	30.0	3.0	5	....	....	....	....	....	....	0.3	....
Sonora, Sutton Co., HE&WT RR A-352	55.0	57.0	[17-24]2	....	10.6	....	20.8	....	....	11.6	....
Tuleta, Bee Co., Brooks & Burleson	35.0	6.0	[17]1	....	0.5	....	0.4	....	....	1.3	....
Victoria Co., James Reed A-236	60.0	32.0	[17-24]2	....	8.6	....	7.4	....	....	6.8	[11]0.1
Enserch Processing Partners Ltd.—Chico, Jack Co., J.U. Fields A-218	30.0	17.6	7	....	....	....	....	....	84.1	....	....
Decatur, Wise Co., David Moses A-357	18.0	10.5	7	....	....	....	....	....	41.9	....	....
Gilliland, Knox Co., C of H&TC RR	14.0	2.2	3	....	....	....	....	....	4.0	....	....
Gordon, Palo Pinto Co., Thomas Reed A-384	50.0	36.2	7	....	....	....	....	....	140.2	....	....
Madisonville, Madison Co., Alfred Gee A-16	20.0	14.6	[27]5	....	....	....	....	....	1.8	....	....
Novice, Coleman Co., T&NO RR Co. 24-2	4.5	3.0	3	....	....	....	....	....	4.5	....	....
Pueblo, Eastland Co., SPRR-464	20.0	15.8	7	....	....	....	....	....	90.5	....	....
Ranger, Eastland Co., H&TC RR 4-4	18.0	21.5	3	....	....	....	....	....	117.7	....	....
Reprieve, Hardeman Co., L. Bechtol, 2	3.0	1.4	3	....	....	....	....	....	6.4	....	....
Santa Anna, Coleman Co., Mary Ann Fisk 630, A-195	5.0	2.8	3	....	....	....	....	....	2.6	....	....
Springtown, Parker Co., JL Hodges A-690	80.0	42.9	7	....	....	....	....	....	144.0	....	....
Trinidad, Henderson Co., No. Addison A-17	65.0	59.6	7	....	....	....	....	....	100.6	....	....
Exxon Co.—*Anahuac, Chambers Co., H&TCRR, 51 A-112	293.0	80.0	[17]2	....	....	....	....	....	70.8	....	....
Clear Lake, Harris Co., James Lindsey A-43	150.0	126.0	[17]2	....	....	....	....	....	118.0	....	....
*Conroe, Montgomery Co., Ransom House	125.0	90.0	[17]2	....	....	....	....	....	95.3	....	....
East Texas, Rusk, T. J. Martin	25.0	6.9	3&6	....	11.1	....	....	....	44.0	....	[5]40.5
Hawkins, Wood Co., H. Watson	115.0	112.0	[17]2	18.2	45.2	21.4	28.2	....	....	54.4	....
Hawkins Cryogenic, Wood Co., H. Watson	40.0	26.6	7	9.1	9.2	4.0	4.7	....	....	9.7	....
Heyser, Calhoun Co., Agaton Sisneros A-36	30.0	22.0	7	....	....	....	....	....	19.9	....	[11]0.8
Katy, Waller Co., T. S. Reese 110, A-332	960.0	275.0	[17]2	351.3	132.6	....	149.7	....	....	....	....
Kelsey, Brooks Co., La Blanca A-459	165.0	20.0	[17]2	....	....	....	....	....	40.6	....	....
King Ranch, Kleberg Co., R. King A-172	925.0	638.0	[17]2	455.8	184.8	65.0	55.4	....	....	146.6	....

	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
Company, plant, location	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Neches, Cherokee Co., J. H. Shaw	30.0	30.0	[17]2	....	....	....	....	....	66.5	....	....
Pyote, Ward Co., 32-16 ULS	100.0	42.0	7	....	....	....	....	....	61.2	....	....
Sabine Lake, Orange Co., Wm. A. Davis A-7	20.0	20.0	7	....	....	....	....	....	65.1	....	....
Sand Hills, Crane Co., 18-32 PSL	65.0	23.0	7	....	....	....	....	....	101.3	....	....
Sarita, Kenedy Co., J. A. Balli A-2	95.0	54.0	7	....	....	....	....	....	70.5	....	....
Tomball, Harris Co., C. Goodrich	60.0	21.0	[17]2	....	....	....	....	....	17.0	....	....
Tom O'Connor, Refugio Co., Maria Ximines A-324	165.0	131.0	7	....	....	....	....	....	128.6	....	[11]12.5
Trawick, Nacogdoches and Rusk Cos.	135.0	65.0	[31]1	....	....	....	....	....	....	....	....
Farmland Industries Inc.—Bailey, Schleicher Co., 522-TT	15.0	13.6	7	....	....	....	....	....	94.2	....	....
Eldorado, Schleicher-Irion-Reagan Cos., 33-M-GH&SA	35.0	31.5	7	....	....	....	....	....	98.7	....	....
Mertzon, Schleicher-Irion-Tom Green Cos., Tom Green CSL-1	50.0	24.1	7	....	....	....	....	....	160.0	....	....
Quitman, Wood Co., S.G. Purse A-456	10.0	3.9	3	....	....	....	....	....	20.7	....	....
Fort Chadbourne Corp.—Box Elmdale, Callahan Co., 4 miles e of Abilene	4.0	2.0	3	....	....	....	....	....	4.0	....	....
Tuscola, Taylor Co., 2 miles w of Tuscola	4.0	3.0	3	....	....	....	....	....	6.0	....	....
Gerlane Petroleum Co.—Mobeetie, Wheeler Co., 1 mile w of Mobeetie	12.0	3.0	[17-24]2	....	....	....	....	....	6.0	....	....
GGSI Gathering & Processing Co.—Apple Creek, Glasscock Co., 7-32-4s	30.0	18.7	7	....	....	....	....	....	128.1	....	....
Gulf Energy Gathering & Processing—Palo Pinto Co., J.H. Brown A-1092	12.0	14.5	7	....	....	....	....	42.8	....	....	....
*Runge, Karnes Co., Cabeza Creek area, Ramon Musquiz A-8	52.0	28.4	[17]2	....	....	....	....	49.6	....	....	....
Houston Oil & Minerals Corp.—Giddings, Lee Co., J. Vashary League A-329	5.0	3.5	3	....	....	....	....	....	8.4	....	....
Madisonville, Madison Co., John Talbert A-30	1.0	0.8	4	....	....	....	....	....	1.2	....	....
Smith Point, Chambers Co., E. T. Branch A-40	105.0	38.0	5	....	....	....	....	....	....	6.6	....
South Liberty, Liberty So., E. Munson League A-88	18.0	10.0	3	....	....	....	....	....	2.0	....	....
Texas City Dike, Galveston Co., T. G. Western A-204	50.0	17.0	7	....	....	....	....	....	17.6	....	[5]20.0
Hunt Oil Co.—*Fairway, Henderson Co., Jose Mora A-497	87.5	67.0	[17]2	....	....	....	....	....	157.5	....	....
*Pecos Valley, Pecos Co., 106-T&ST-L	10.0	3.0	3	....	....	....	....	....	2.7	....	....
Kerr-McGee Corp.—Chapel Hill #35, Smith Co., Stillwell Box A-169	35.0	NR	7	....	18.9	....	13.4	....	20.3	....	....
Hobart Ranch, Hemphill Co., 70 A-2 N&GN	43.5	NR	7	....	....	....	....	....	94.7	....	....
Pampa, Gray Co., 163-3 I&GN	24.0	NR	2	....	....	....	....	....	28.8	....	....
Koch Hydrocarbon Co.—Sterling Co., 141-2 H&TC RA	5.0	3.3	3	....	....	....	....	....	14.9	....	....
Ladd Petroleum Corp.—Southwest Ozona, Crockett Co., 2-2 HGN RR 28 mi sw of Ozona township	23.0	17.0	[17]1-[24]2	....	....	....	....	74.3	....	....	....
Mapco Westpan Inc.—Bivins, Moore Co., 33-PMc, ELRR	100.0	13.4	[36]2	....	....	....	....	....	39.4	....	....
Fritch 950, Hutchinson Co., 92-Y2-TTRR	60.0	35.0	[36]2	....	....	....	....	....	122.0	....	....
Fritch 1000, Hutchinson Co., 92-Y2-TTRR	100.0	1.0	[1]2	....	....	....	....	....	2.5	....	....
Marathon Oil Co.—Markham, Matagorda Co., 4-9-9	21.0	18.0	3	....	....	....	....	4.3	....	....	....
Susan Peak, Tom Green Co., 193 SPRR-11	3.3	2.8	3	....	....	....	....	....	8.0	....	....
Welder, San Patricio Co., 49 Robert Montgomery 199 and Ewan Cameron A-97	55.0	7.0	1	....	....	....	....	....	1.6	....	....
*Yates, Pecos Co., I.G. Yates, 194 SF 1234-1	72.0	36.0	3-7	....	....	....	....	....	52.1	....	[11]2.8
Mesa Limited Partnership—Fain, Potter Co., G&M 10-181-B	80.0	36.9	7	....	....	....	....	....	107.0	....	....
Mills Bennett Estate—Brooks Co., El Tule Grant A-257	8.0	1.5	[3]2	....	....	....	....	1.1	....	....	....
Mitchell Energy & Development Corp.—											
Barton Chapel 1, Jack Co.	15.0	10.5	7	....	....	....	....	....	37.2	....	[11]0.6
Barton Chapel 2, Jack Co.	20.0	13.9	7	....	....	....	....	....	51.3	....	[11]0.8
Brent Ranch, Moore Co.	20.0	0.4	7	....	....	....	....	....	1.4	....	[11]0.1
Bridgeport 1, Wise Co.	150.0	124.7	7	....	125.9	20.0	21.6	....	266.4	66.1	[11]9.1
Bridgeport 2, Wise Co.	20.0	16.6	7	....	16.7	2.6	2.9	....	35.4	8.8	[11]1.2
Bridgeport 3, Wise Co.	20.0	16.6	7	....	16.7	2.6	2.9	....	35.4	8.8	[11]1.2
Bryan Hicks, Brazos Co.	20.0	13.3	7	....	....	....	....	....	47.7	....	....
Cisco, Eastland Co.	15.0	9.2	7	....	....	....	....	....	38.8	....	[11]0.6
Cottonwood, Callahan Co.	15.0	9.1	7	....	....	....	....	....	43.2	....	....
Gibtown, Jack Co.	15.0	6.6	7	....	....	....	....	....	26.0	....	[11]0.4
Gum Island, Jefferson Co.	40.0	3.4	7	....	....	....	....	....	9.9	....	....
Huckabay No. 1, Erath Co.	15.0	10.9	7	....	....	....	....	....	43.0	....	[11]0.3
Huckabay No. 2, Erath Co.	15.0	10.9	7	....	....	....	....	....	43.0	....	[11]0.3
Huckabay No. 3, Erath Co.	15.0	10.9	7	....	....	....	....	....	43.0	....	[11]0.3
Live Oak Co.	20.0	2.4	7	....	....	....	....	....	6.5	....	....
Lone Camp No. 2, Palo Pinto Co.	10.0	4.9	7	....	....	....	....	....	25.1	....	[11]0.3
Lone Camp No. 3, Palo Pinto Co.	10.0	4.9	7	....	....	....	....	....	25.1	....	[11]0.3
Lone Camp No. 4, Palo Pinto	30.0	14.8	7	....	....	....	....	....	75.1	....	[11]0.8
Mineral Wells, Palo Pinto Co.	15.0	8.2	7	....	....	....	....	....	48.3	....	[11]1.2
Morgan Mill No. 1, Erath Co.	15.0	5.6	7	....	....	....	....	....	17.4	....	[11]0.1
Morgan Mill No. 2, Erath Co.	15.0	5.6	7	....	....	....	....	....	17.8	....	[11]0.1
Morgan Mill No. 3, Erath Co.	20.0	7.4	7	....	....	....	....	....	23.4	....	[11]0.2
Ponder, Denton Co.	2.0	2.3	7	....	....	....	....	....	5.1	....	[11]0.2
Port Arthur, Jefferson Co.	115.0	85.8	7	....	....	....	....	....	82.7	....	....
Ranger No., Eastland Co.	10.0	5.4	7	....	....	....	....	....	20.2	....	[11]0.5
Rockdale, Milam Co.	20.0	1.5	7	....	....	....	....	....	10.6	....	....
Schreiner Ranch, Live Oak Co.	20.0	8.8	7	....	....	....	....	....	35.2	....	[11]<0.1
Seven Oaks, Polk Co.	20.0	7.5	[24]2	....	....	....	....	....	16.6	....	....
Springtown, Parker Co.	15.0	9.2	7	....	....	....	....	....	27.7	....	[11]0.1
TP, Hutchinson Co.	5.0	1.2	3	....	....	....	....	....	4.5	....	[11]0.2
Wellborn, Brazos Co.	5.0	3.6	3	....	....	....	....	....	16.2	....	....

Company, plant, location	MMcfd Gas capacity	MMcfd Gas throughput	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Winnie, Jefferson Co.	75.0	42.1	7	....	....	....	....	....	46.2	....	....
Mobil Producing Texas & New Mexico Inc.—											
*Coyanosa, Pecos Co., 48-OW TTRR	140.0	105.0	7	....	....	....	....	16.7	144.6	....	[11]66.9
East White Point, San Patricio Co., G.H. Paul subdiv. of Coleman Fulton Pasture Lands	25.0	11.8	7	....	....	....	....	...	24.4	....	....
Electra, Wilbarger Co., 17-13 H&TC RR	1.2	0.8	3	....	....	....	....	....	12.6	....	....
Hagist, Duval Co., BS&F 267	35.0	13.5	1	....	....	....	....	....	13.0	....	....
LaGloria, Jim Wells Co., 9-3 Rangeland 7 Herring subdiv. LaGloria Townsite subdiv	320.0	200.0	7	182.0	82.0	26.0	21.0	....	....	54.0	[11]6.1
*Lake Creek, Montgomery Co.	5.5	4.1	7	1.5	2.2	0.6	1.0	....	....	1.4	....
*Pegasus, Midland Co., e2 30-40-4s T&PRR	90.0	84.0	7	77.7	....	....	....	....	165.9	....	....
*Portillo, San Patricio Co., M. S. Welder	15.0	13.8	2	4.0	4.1	1.5	1.8	....	....	5.3	....
Sabine Pass, Jefferson Co., F. C. McReynolds 126 A-432 T&NO RR, 127 A-245, John McGaffey A-167	200.0	85.0	7	....	....	....	....	....	90.9	....	....
Salt Creek, Kent Co., W&NW RR G-193	28.0	12.7	3	....	....	....	....	....	131.7	....	....
Vanderbilt, Jackson Co., R. Musquex A-59	56.7	89.1	2	....	....	....	....	....	....	....	[5]6.4 [9]0.3 [13]3.3 [11]1.7
Waha, Pecos Co., 5-C3 PSL	125.0	54.0	7	....	....	....	....	....	117.6	....	
Wilcox, Lavaca Co., J.R. Ragsdale A-377	235.0	119.0	2	18.4	18.3	....	12.0	....	....	12.0	....
Natural Gas Pipeline Co. of America—											
CP 170, Moore Co., w½ of nw¼ section 1 of TTRR	80.0	50.0	7	....	....	....	....	....	170.0	....	....
Parade Co.—Giles, Rusk Co.	3.0	1.7	3	....	....	....	....	....	17.2	....	....
Permian Corp.—Possum Kingdom, Stephens Co., E. Romerhausen A-149	5.0	2.0	3	....	....	....	....	....	6.0	....	....
Todd, Crockett, 28-WX GC&SF RR	5.0	2.0	3	....	....	....	....	....	11.0	....	....
Perry Gas Products Inc.—Perry-LaGrange, Fayette Co., Wm. Rabb 3 League A-86	100.0	0	7	....	....	....	....	....	....	25.0	....
Phillips, Jack L.—Nan Su Gail, Freestone Co.	7.0	1.0	3	....	....	....	....	....	1.3	....	....
Phillips Petroleum Co.—Andrews Co., w2 nw4 19-A 46 PSL	115.0	NR	1-2&6	....	....	....	....	....	....	....	....
Birthright, Hopkins Co., Linecum A-561 and Hargrave A-426	30.0	NR	3	....	....	....	....	....	....	....	....
Brazoria Co., nw4,5 HT&B A-221	55.0	NR	2&7	....	....	....	....	....	....	....	....
Crane Co., ne4 216-F CCSD&RGNG RR	20.0	NR	7	....	....	....	....	....	....	....	....
Dumas, Moore Co., nw4-181-44 H&TC	120.0	NR	7	....	....	....	....	....	....	....	....
East Chapa, Live Oak Co., Chapa A-697	50.0	NR	7	....	....	....	....	....	....	....	....
Fullerton, Andrews Co., Center S-17 A-32 PSL	55.0	NR	7	....	....	....	....	....	....	....	....
Giddings, Fayette Co., David G. Green A-193	75.0	NR	7	....	....	....	....	....	....	....	....
Goldsmith, Ector Co., nw4-se4-33-44 T&P-1n	82.0	NR	7	....	....	....	....	....	....	....	....
Gray Co., e2-32-2 H&GN	74.0	NR	2	....	....	....	....	....	....	....	....
Luling, Caldwell Co., north corner John Henry A-12	12.0	NR	2&7	....	....	....	....	....	....	....	....
Pantex, Hutchinson Co., B&9 M. Whitley	20.5	NR	2&7	....	....	....	....	....	....	....	....
Puckett, Pecos Co., n2 26-101 TCRR	250.0	NR	5	....	....	....	....	....	....	....	....
Quarry, Washington Co., Nelson-Whitehead A-108	75.0	NR	7	....	....	....	....	....	....	....	....
Rock Creek, Hutchinson Co., nw4-22-y A&B	180.0	NR	7	....	....	....	....	....	....	....	....
Sherman, Hansford Co., 7&8-1 PSL	340.0	NR	7	....	....	....	....	....	....	....	....
Sneed, Moore Co., w2-nw4 Freeman Brazemore	250.0	NR	1	....	....	....	....	....	....	....	....
Spraberry, Midland Co., se4-25 3s-37 T&P	25.0	NR	7	....	....	....	....	....	....	....	....
Portal Drilling Co.—McMullen Co., Benjamin Odlum A-9	2.2	3.4	3	....	....	....	....	....	9.5	....	....
Pronto Gas Products Inc.—Archer City, Archer Co.	1.0	0.1	3	....	....	....	....	....	0.6	....	....
Moran, Shackelford Co.	2.0	1.8	3	....	....	....	....	....	2.1	....	....
Wall, Tom Green Co.	0.8	0.2	3	....	....	....	....	....	0.2	....	....
Seagull Energy Corp.—Matagorda Co., Lot 29 Moore Pasture subdivision	250.0	194.0	7	....	....	....	....	....	215.3	....	....
Shell Western E&P Inc.—Big Foot, Frio Co.	0.5	0.1	3	....	0.1	....	0.1	....	....	0.2	....
*Bryans Mill, Cass Co., B.F. Lynn A-651	70.0	45.0	2	....	28.5	....	....	41.0	....	....	....
Diamondback, Duvall Co.	30.0	12.0	7	....	....	....	....	....	25.1	....	....
Eustace, Henderson Co. Vincente Michelli A-485	70.0	27.0	7	....	....	....	....	....	183.3	....	....
Fandango, Zapata Co.	90.0	48.0	...	....	....	....	....	....	....		
Houston Central, Colorado Co., F. Mayhar A-400 K. Winn A-589	285.0	122.0	2	113.2	70.8	16.4	18.2	....	....	61.0	....
NW Ozona, Crockett Co., ne14 46-OP GC&SF RR	10.0	5.0	3	....	....	....	....	11.4	....	3.8	....
Tippett, Crockett Co., 38-31-H&TC RR	55.0	25.1	6	36.8	26.8	....	....	33.5	....	....	....
TXL, Ector Co., 17-45-1s T&P RR	40.0	24.0	2	43.5	41.9	....	20.5	....	....	17.7	....
Wasson, Yoakum Co., nw¼ 827 sw¼ 802-D John H. Gibson	190.0	72.0	2	130.0	173.1	....	....	227.0	....	....	....
Sid Richardson Carbon & Gasoline Co.—Chalk, Cottle Co., nw¼ of C.L. Carter FP 4480	15.0	8.1	3	....	....	....	....	....	16.2	....	[11]1.9
Eskota, Fisher Co., 11 T&PRR-19	12.0	7.1	6	....	....	....	....	....	70.0	....	[11]0.1
Halley, Winkler Co., e2-22-B11-PSL	60.0	31.9	7	....	....	....	....	....	103.0	....	[11]1.3
Keystone, Winkler Co., 5-B2 & 1&2 B3-PSL	120.0	89.5	7	....	....	....	....	....	237.5	....	[11]1.4
Sterling Co., 11 acres 2-31-5s T&P RR	40.0	16.7	7	....	....	....	....	....	78.5	....	....
Southwest Forest Gas Gathering Co.—Rocker B 1, Reagan Co., 17 miles ne Big Lake	16.0	6.0	7	....	....	....	....	....	36.0	....	....
SPG Exploration Corp.—Martha F. Berry, Frio Co., M.C. Patton, 1178 A-542	5.0	3.0	6	....	....	....	....	....	7.3	....	....
Ozona, Crockett Co., nw¼ BMN GC&SF RR	60.0	21.5	[17]2	....	27.1	....	12.3	....	....	7.9	[11]12.0
Sun Exploration & Production Co.—Big Wells, Dimmitt Co., I&GN A-223 82-1	20.0	7.3	[17]2	....	5.6	....	3.8	....	....	2.0	....
*Desdemona, Eastland Co.	NR	1.2	3	....	....	....	....	....	7.9	....	....

Company, plant, location	MMcfd Gas capacity	Gas through-put	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Jameson, Coke Co., 315-1A N&TCRR	70.0	35.7	6&7	....	54.6	50.2	....	....	....	39.1	[5]182.7
Kurten, Brazos Co., James Simpson A-208	35.0	28.7	[17]2	....	....	....	....	....	41.9	....	....
Snyder, Scurry Co., 16-1 JP Smith	50.0	44.7	7	....	95.1	69.6	....	....	....	83.8	[5]261.3
Sun, Starr Co., 239 AB-225 CCSDR RGN GRR	92.0	94.5	[17]2	....	37.4	....	33.2	....	36.4	....	[5]67.0
Tijerina-Canales, Jim Wells Co., 343 CCSD&R GNG RR A-119	40.0	24.4	[17]2	....	6.4	....	8.2	....	....	5.1	[5]25.3
Tenneco Oil Processing & Marketing—Chesterville, Colorado Co., Thomson A-708	55.0	NR	2	....	....	....	....	....	16.9	....	....
Magnolia City, Nueces Co.	60.0	57.5	7	....	....	....	....	....	74.4	....	....
McAllen Ranch, Hidalgo Co.	22.5	22.0	7	....	....	....	....	....	30.9	....	....
O.W. Ward, Hidalgo Co., Porcion 68, Gregario Comancho A-28	145.0	36.1	2	....	5.4	....	4.0	....	....	4.2	....
Texaco—Bradford Ranch, Midland Co., 13-39-3s, T&P RR	12.5	12.5	7	....	....	....	....	....	61.9	....	....
Burleson Co., J. P. Coleson A-12	30.0	10.0	6-7	....	....	....	....	....	32.5	....	....
Burnett Ranch, Carson Co., 83-5 I&GN	15.0	4.7	3	....	....	....	....	....	14.1	....	....
East Vealmoor, Howard Co., 20-27-H&TC	50.0	30.8	7	104.4	127.9	15.1	47.9	....	....	50.3	....
El Paso, Carson Co., 88-4-1n I&GN RR	150.0	79.0	[17]1	....	....	....	....	....	26.8	....	....
Fuller, Scurry Co., ne¼ 652-97 H&TC RR	5.0	3.0	3	....	....	....	....	....	51.0	....	....
George West, Live Oak Co., G.W. West sub D 200&201	23.0	21.0	6-7	....	....	....	....	....	67.2	....	....
Handy, Grayson Co., se¼ I&GN RRA-1441	12.0	1.3	[17]2	....	....	....	....	....	8.1	....	....
*Headlee Devonian, Ector-Midland Co., ne¼ of nw¼ 29-41-2s T&PRR	190.0	188.6	7	....	....	....	....	....	415.7	....	....
Luby, Nueces Co., Canutillo Colony Dutch Co.	20.0	14.0	6-7	....	....	....	....	....	12.4	....	....
Mabee, Andrews Co., s¼ 32-40-2n, G&MMB & A	5.0	3.8	6	....	....	....	....	....	14.1	....	....
Masterson, Potter Co., 8-G&M 3	10.0	0.6	3	....	....	....	....	....	3.1	....	....
McLean, Gray Co., 68-23 H&GN RR	26.0	0.7	7	....	....	....	....	....	1.8	....	....
Odem, San Patricio, Juan Hart & Sons A-10 J. F. Welder Tract	23.0	12.1	6-7	....	....	....	....	....	12.6	....	....
Ozona, Crockett, n½ 3-MN, GC&SF RR	25.0	10.6	7	....	....	....	....	....	41.9	....	....
Pangaea-Bivins, Potter Co., sw4 22-0-18 D&P	10.0	1.5	3	....	....	....	....	....	1.0	....	....
*Schafer, Carson Co., 88-4-1n I&GN RR	55.0	32.1	[1]1&7	....	....	....	....	....	152.4	....	....
South Kermit, Winkler Co., sw¼ 22 B-3, PSL	42.0	11.8	7	....	12.4	....	....	....	29.3	....	....
Spearman, Ochiltree Co., 23-R-B&B	50.0	41.5	2	....	12.4	....	....	....	13.2	....	....
Streetman, Freestone Co., A-536, Jefferson Richards	15.0	4.1	6-7	....	....	....	....	....	19.7	....	....
*Watkins, Hutchinson Co., 13 M31 T&C RR	20.0	...	1	....	....	....	....	....	....	....	....
(Throughput and debutanized nat. gas included in Schafer).											
Texas Oil & Gas Corp—Booker, Lipscomb Co., w2-sw4 1116-43 H&TC RR	6.0	1.8	3	....	....	....	....	....	2.8	....	....
Coyanosa, Pecos Co., 18-143-T&SL RR.	75.0	56.7	7	....	....	....	....	....	127.0	....	[11]0.6
Denton Co., BBB&CRR A-161	30.0	12.7	[17]2	....	....	....	....	....	39.3	....	....
East Texas, Marion Co., John H. Kernels A-236	75.0	25.3	7	7.1	....	....	8.6	....	....	6.0	[11]0.3
Grapeland, Houston Co., 2 JDJ Procella League A-69	165.0	64.4	7	....	....	....	....	....	42.1	....	....
La Paloma, Kenedy Co., Santa Rosa de Arriba Pedro de la Garza A-36	20.0	1.1	7	....	....	....	....	....	1.7	....	....
Laredo, Webb Co., Porcion 14 of N.D. Hachar Estate	30.0	11.7	[17]2	....	....	....	....	....	11.4	....	[11]0.2
Longview, Gregg Co., Frost Thorn A-5	100.0	32.0	7	....	....	....	....	....	16.8	....	[5]30.9
Shackelford, Callahan Co., nw corner 24 sw corner 23 Bayland Orphan Home Land	30.0	14.2	[17]2	....	....	....	....	....	37.5	....	....
Three Rivers, Live Oak Co., J.D. Jamison 168 A-268	25.0	8.9	7	....	....	....	....	....	25.1	....	[11]1.0
Union Texas Petroleum Corp.—Benedum, Upton Co., Sect. G, C. Bendle A-657	40.0	36.0	7	74.2	69.5	8.6	25.7	....	....	28.5	....
East Sour Lake, Hardin Co., 384 A-784 J.F. Keith	20.0	17.5	7	6.8	15.1	4.9	4.8	....	....	5.8	....
Noel, Eastland Co., ne 4 31-3 H&TC RR	30.0	18.0	7	12.0	10.4	1.4	3.4	....	....	3.6	....
Perkins, Coke Co., 2-H&TC RR	25.0	24.0	7	62.2	59.6	9.3	22.6	....	....	22.9	....
Walnut Bend, Grayson Co., E.L. Stickney A-1089	10.0	6.6	7	11.4	10.4	1.5	4.1	....	....	4.3	....
Wellman, Terry Co.	6.0	2.7	7	1.4	3.8	0.6	1.9	....	....	2.0	....
United Texas Transmission Co.—Galveston Bay, Chambers Co., J. Armstrong A-2	40.0	10.6	7	....	....	....	....	....	7.5	....	[11]<0.1
Unocal—Dollarhide, Andrews Co., 25-A52-PSL	13.0	4.3	6	....	....	....	....	....	36.2	....	....
*Fort Trinidad, Houston, Co., RCS A-23	40.0	13.0	[34]1	....	11.6	....	8.6	....	4.7	....	....
Van, Van Zandt Co., JWS A-891	15.0	8.7	[34]2	....	7.2	....	10.1	....	....	11.1	....
Upham Oil & Gas Co.—Bridgeport, Wise Co., Wm. Hersee	12.0	8.0	2	....	9.6	....	5.8	....	7.3	....	....
Valero Hydrocarbons Co.—Armstrong, DeWitt Co. James A. Moody A-333	400.0	338.7	7	242.2	137.8	34.3	41.8	....	63.5	....	....
Bel Junction, Hidalgo Co., TexMex RR A-211	90.0	74.0	7	64.0	25.2	9.0	7.5	....	17.3	....	....
Fort Stockton, Pecos Co., 3-OW, F.M. Hoffman	7.5	1.8	7	2.1	2.5	0.4	0.9	....	1.0	....	....
Freer, Webb Co. BS 1-4 A-1954	190.0	117.6	2	22.6	34.0	8.9	8.6	....	17.8	....	....
Garden City, Sterling Co., 30-22, A-698 H&TC RR	40.0	51.1	7	94.4	87.4	10.0	27.5	....	19.7	....	....
San Martin, Bexar Co. 4010 F. Farias 15 A-2	150.0	150.3	7	101.6	71.5	18.1	25.5	....	34.7	....	....
Shoup, Nueces Co., AB&M 409 A-555	300.0	247.1	7	181.2	82.7	26.6	23.1	....	44.4	....	....
Sonora, Sutton Co., 122, HE&WTRR A-1117	44.0	29.3	7	38.3	24.1	3.7	7.4	....	7.7	....	....
Warren Petroleum Co.—Breckenridge, Stephens Co., n2 22 LAL	NR	11.0	7	....	....	....	....	....	61.0	....	....
Canadian, Hemphill Co., 216 G&MMB&A-C.	NR	10.0	7	....	....	....	....	....	20.1	....	....
Como, Hopkins Co., Nacogdoches Univ. A-703	NR	5.0	7	....	4.6	....	5.3	....	....	2.3	....

	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
Company, plant, location	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Fashing, Atascosa and Karnes Cos., Emma Tar H. et al, tract in James Wilkerson 149 A-882	NR	36.5	2	....	11.8	....	7.9	....	....	15.6	....
Gladewater, Gregg Co., David Ferguson	NR	6.2	7	....	....	....	....	....	91.0	....	....
Gruver, Hansford, sw4 5-WDC Hall	NR	2.4	7	....	....	....	....	....	4.1	....	....
McLean, Wheeler Co., 33-24 H&GN RR	NR	7.9	6	....	....	....	....	....	45.3	....	....
Monahans, Ward Co., 4-F	NR	22.0	7	....	....	....	....	....	83.0	....	....
Moores Orchard, Fort Bend Co., German Emigration No. 8	NR	8.9	7	....	....	....	....	....	16.1	....	....
Sand Hills, Crane Co., 21-PSL B-21	NR	105.0	[17]2&7	....	....	....	....	....	451.0	....	....
Shackelford Co., TE&L 522 & 523	NR	10.0	7	....	....	....	....	....	66.0	....	....
Sherman North, Grayson Co., Uriah Burns A-121	NR	8.9	2	....	9.3	....	....	....	8.1	2.9	....
Sherman South, Grayson Co., James S. Coffee A-232	NR	1.8	7	....	....	....	....	....	0.5	....	....
Snyder North, Scurry Co., ne4 440 H&TCRR B-97	NR	24.0	7	....	....	....	....	....	90.0	....	....
Spear, Gregg & Rusk Co., Mary Van Winkler	NR	1.5	7	....	....	....	....	....	19.4	....	....
Tolar, Hood Co., Lewis Boatright A-33	NR	0.8	7	....	....	....	....	....	1.2	....	....
Tonkawa, Hemphill Co., 78-41 H&TC RR	NR	1.8	3	....	....	....	....	....	1.5	....	....
Worsham, Ward Co., 56-34 H&TC RR	NR	7.0	7	....	....	....	....	....	12.0	....	....
WilGas Co.—A&M, Burleson Co., John P. Coles A-12	65.0	32.0	3&7	....	....	....	....	....	146.2	23.1	....
La Grange, Fayette Co., James Green A-189	200.0	129.0	7	....	....	....	....	....	567.8	20.5	....
WW Sub Inc.—*Markley, Jack Co., SPRR A-583	2.0	1.0	3	....	....	....	....	....	3.9	....	....
Total	**19,045.5**	**11,574.4**		**3,395.5**	**3,464.9**	**536.2**	**1,464.4**	**697.4**	**12,441.7**	**1,888.9**	**1,770.6**

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† Fractionation. (Figures in parenthesis do not represent primary production, and are not added in state totals). §Butane-gasoline mix.

UTAH

Company, plant, location	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Champlin Petroleum Co.—Pineview, Summit Co., 3-2n-7e	10.0	2.6	3	....	5.2	....	....	....	§14.3	....	....
Yellow Creek, Summit Co. 16-3n-8e	80.0	46.7	7	....	34.9	....	....	....	§31.3	....	....
Chevron USA Inc.—Red Wash, Uintah Co., ne4 21 nw4 22-7s-23e	38.0	7.0	[5]5-[3]3	....	....	....	....	....	....	2.5	....
Coastal Oil & Gas Corp.—*Altamont, Duchesne Co., 34-1s-4w	40.0	15.0	3	....	16.8	....	10.5	....	....	19.9	....
El Paso Natural Gas Co.—Aneth, San Juan Co., nw4-6-41s-24e	100.0	14.4	[15]1	....	1.1	....	....	....	71.8	....	....
Gary Energy Corp.—Altonah, Duchesne Co., sw-nw 5-2s-3w	12.5	1.3	3	....	0.6	....	0.8	....	....	0.8	....
Bluebell, Duchesne Co., sw-nw 23-1s-2w	23.0	11.3	[17]2	....	13.8	....	....	....	23.5	....	....
Koch Hydrocarbon Co.—Cedar Rim, Duchesne Co., 21-35-6w	12.0	5.1	3	....	2.9	....	2.9	....	4.8	....	....
Marathon Oil Co.—Tin Cup Mesa, San Juan Co., 25-38s-25e	1.0	1.4	3	....	....	....	....	....	4.2	....	....
Mountain Fuel Resources Inc.—Price, Carbon Co., 8-14s-10e	120.0	77.7	3	....	....	....	....	....	3.7	....	....
Unocal—*Lisbon, San Juan Co., 22-30s-24e	80.0	53.7	3	....	20.9	....	14.0	....	....	17.2	....
Total	**516.5**	**236.2**		....	**96.2**	....	**28.2**	....	**153.6**	**40.4**	....

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§Butane-gasoline mix.

WEST VIRGINIA

Company, plant, location	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Columbia Gas Transmission Corp.—Cobb, Kanahwa Co., Big Sandy district	35.0	32.0	[17]2	....	....	....	....	....	41.5	....	....
Kenova, Wayne Co., Ceredo district	120.0	120.0	[17]2	....	....	....	....	....	130.0	....	....
Consolidated Gas Transmission Corp.—Hastings, Wetzel Co.	150.0	118.6	3	210.1	129.6	22.1	41.8	....	41.3	....	....
Gulf Energy Gathering & Processing—Copley Run, Lewis Co.	40.0	26.8	7	....	....	....	....	33.1	....	....	....
Schultz, Pleasants Co.	10.0	8.1	7	....	....	....	....	23.6	....	....	....
West Union, Doddridge Co.	15.0	11.4	7	....	....	....	....	21.4	....	....	....
Pennzoil Producing Co.—9 small plants	9.0	5.0	4	....	....	....	....	....	....	2.0	....
Total	**379.0**	**321.9**		**210.1**	**129.6**	**22.1**	**41.8**	**78.1**	**212.8**	**2.0**	....

WYOMING

Company, plant, location	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Amoco Production Co.—Bairoil-Wertz, Sweetwater Co., 7-26n-90w	...	...	3	....	4.0	....	....	....	12.3	....	....
Beaver Creek, Fremont Co. 10-33n-96w	65.0	25.2	[37]2	....	13.2	....	11.2	....	....	9.0	....
Beaver Creek Phosphoria, Fremont Co., 10-33n-96w	14.0	7.0	4	....	....	....	....	....	....	....	[11]7.3
Elk Basin, Park Co., 29-48n-99w	17.0	11.9	[39]2	....	18.4	....	16.0	....	....	19.3	....
Ryckman Creek, Uinta Co., e2-13-17n-119w-6pm	60.0	49.1	3	....	....	....	....	....	41.0	....	....
Whitney Canyon, Uinta Co., 17-17n-119w	275.0	139.0	7	....	....	....	....	....	126.3	....	[11]120.2
Arco Oil & Gas Co.—Gillette, Campbell Co., 18-50n-73w	31.0	10.1	3	....	20.2	....	10.9	....	....	9.1	[11]0.8
Riverton Dome, Fremont Co., 36-1s-4e	30.0	11.1	[24]2	....	....	....	....	....	....	4.0	....
Champlin Petroleum Co.—*Brady, Sweetwater Co., 11-16n-101w	65.0	57.0	[17]2	....	16.8	....	30.7	....	....	21.6	....
Emigrant Trail, Uinta Co., 1-16n-113w	60.0	43.0	7	....	....	....	....	....	47.7	....	....
Manning, Converse Co., 15-39n-73w	3.0	0.5	3	....	....	....	....	....	0.7	....	....
Patrick Draw, Sweetwater Co., 25-19n-99w	25.0	20.0	7	7.7	13.0	2.9	4.8	....	....	6.1	....
Chevron USA Inc.—Carter Creek, Uinta Co., 6-18n-119w	150.0	110.0	2	....	....	....	....	....	....	142.8	....
Enron Gas Processing Co.—Painter, Uinta Co. nw4 6-15n-119w	64.4	64.3	3	....	....	....	....	....	113.0	....	....

Company, plant, location	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
	Gas capacity	Gas throughput	Process/ Condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Farmland Industries Inc.—Gillette, Campbell Co., 1-49n-74w	7.0	1.8	3	....	4.2	....	....	....	4.4	....	....
Inexco Oil Co.—Well Draw, Converse Co., ne se9-35n-70w	25.0	6.0	[17]2	....	15.0	....	....	....	14.0	....	....
KN Energy Inc.—Casper, Natrona Co., 10-33n-78w	80.0	43.2	1	....	13.0	....	4.2	....	....	3.1	....
Flat Top, Converse Co., 20-33n-68w	5.0	1.6	1	....	2.4	....	....	2.7	....	....	....
Marathon Oil Co.—Oregon Basin, Park Co., 29-51n-100w	6.5	5.0	3	....	....	....	....	....	14.5	....	....
Rock River, Carbon Co., 34-19n-78w	0.5	0.2	3	....	....	....	....	....	0.4	....	....
NGL Production Co.—Moxa Arch, Lincoln Co., 19-19n-112w	30.0	21.1	[27]5	....	....	....	....	....	2.4	....	....
Northwest Pipeline Corp.—Opal, Lincoln Co., 27-21n-114w	400.0	210.0	[17]2&7	....	86.0	....	60.0	....	119.0	30.0	....
Phillips Petroleum Co.—Douglas, Converse Co., se4-ne4 34-33n-71w	75.0	NR	7	....	....	....	....	....	....	....	....
Ralston Processing Associates Inc.—Oregon Basin, Park Co., nw4 8-52n-100w	6.0	0.1	2	....	4.0	....	4.0	....	....	4.0	....
Propane-plus product brought into Basin plant to be fractionated	NA	NA	2	....	1.5	....	1.7	....	....	2.0	....
Sun Exploration & Production Co.—Grieve, Natrona Co., 22-32n-85w	10.0	11.8	[17]2	....	10.3	....	....	....	6.7	....	....
Unocal—Worland, Washakie Co., 17-48n-92w.	15.0	13.4	7	....	13.7	....	7.1	....	....	5.2	....
Western Gas Processors Ltd.—Amos Draw, Campbell Co., se¼ nw¼ 32-1n-75w	32.5	30.0	3	....	....	....	....	....	39.0	....	[11]1.9
Fairview, Richland Co., w2 sw4 sw4 24-25n-58e	5.0	4.0	3	....	8.3	....	....	....	....	8.5	[11]0.1
Hartzog Draw, Campbell Co., nw¼ ne¼ 11-45n-76w, 6th PM	6.0	7.5	3	....	....	....	....	....	24.9	....	[11]5.2
Hilight, Campbell Co., 26 sw14-45n-71w	60.0	1.3	3	....	17.1	....	14.2	....	....	8.0	[11]0.8
Mule Creek, Niobrara, se¼ sw¼ 33-38n-63w	4.0	1.9	6	....	....	....	....	....	6.1	....	[11]<0.1
Newcastle, Weston Co., n2-nw4 9-42n-64w.	5.0	3.0	3	....	9.3	....	....	....	....	1.6	[11]10.0
Oedekoven, Campbell Co. 45 55n-73w	12.0	1.6	3	....	1.1	....	0.2	....	....	1.9	[11]0.1
Spearhead, Converse Co., 13-79n-75w	21.0	6.3	2	....	....	....	....	....	11.8	....	....
Wexpro Co.—Church Buttes, Uinta Co., 1-16n-113w	3.5	1.0	[7]1	....	....	....	....	....	3.1	....	....
Total	**1,666.4**	**979.0**		**7.7**	**271.5**	**2.9**	**165.0**	**2.7**	**587.3**	**276.2**	**146.4**

ABU DHABI

Company, plant, location	Gas capacity	Gas throughput	Process/ Condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Abu Dhabi Gas Liquefaction CL—Zakum, Umm Shaif, El Bunduq, Das Island.	450.0	489.8	2-5-6	....	337.3	288.8	....	....	....	184.5	†3,699.0
Abu Dhabi National Oil Co.—											
Adgas, Adma offshore area	530.0	430.0	6&7	....	5.6	....	4.6	....	....	3.2	†42.4
Gasco, Adco onshore area	818.0	440.0	6	....	14.3	....	15.6	....	....	16.2	....
Habshan, Thamama F onshore area	250.0	37.0	5	....	....	....	....	....	....	....	[11]71.4
Habshan, Thamama C onshore area	450.0	155.0	6&7	....	....	....	....	....	....	....	[11]237.8
Total	**2,498.0**	**1,551.8**		....	**357.2**	**288.8**	**20.2**	....	....	**203.9**	**309.2**

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† LNG.

ALGERIA

Company, plant, location	Gas capacity	Gas throughput	Process/ Condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Sonatrach—Camel plant, Arzew	NR	170.0	4&7	....	....	....	....	218.6	....	....	....
Hassi R'Mel, Laghouat, Module 0	NR	1,578.0	NR	....	....	....	....	....	....	....	[11]2,309.0
Hassi R'Mel, Laghouat, Module 1	NR	2,085.2	6	....	....	....	....	....	....	....	[11]3,140.2
Skikda	NR	435.0	4&7	....	....	....	....	414.2	....	....	....
Total	**5,335.2**	**4,268.2**		....	....	....	....	**632.8**	....	....	**5,449.2**

ARGENTINA

Company, plant, location	Gas capacity	Gas throughput	Process/ Condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Cogasco SA—*Loma de la Lata, Neuquén	352.4	211.4	7	....	86.8	....	60.1	....	....	74.0	....
Gas del Estado—*Cañadón Alfa, Tierra del Fuego	NR	76.0	1	....	....	....	....	....	....	18.6	....
*Cañadón Piedras, Tierra del Fuego	NR	50.0	1	....	....	....	....	....	....	7.6	....
*Cañadón Seco, San Jorge, Santa Cruz	NR	11.0	2	....	5.0	....	5.8	....	....	5.3	....
*Caimancito Norte, Ledesma, Jujuy	...	...	2	....	5.0	....	10.2	....	....	2.6	....
*Centenario, Neuquén	NR	25.0	2	....	8.4	....	10.2	....	....	10.6	....
*El Medanito, La Pampa	NR	22.0	3	....	....	....	....	....	....	7.9	....
*Fernandez Oro, Río Negro	NR	15.0	5	....	....	....	....	....	....	0.4	....
*General Cerri, Buenos Aires	636.0	600.0	7	545.0	312.1	....	201.8	....	....	82.0	....
*Loma de la Lata, Neuquen	353.0	318.0	7	....	83.2	....	60.3	....	....	58.1	....
Rio Neuquen, Neuquen	NR	100.0	5	....	....	....	....	....	....	36.9	....
Total	**1,715.0**	**1,428.4**		**545.0**	**500.5**	....	**348.4**	....	....	**304.0**	....

AUSTRALIA

Company, plant, location	Gas capacity	Gas throughput	Process/ Condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Esso/BHP—											
Gippsland No. 1, Longford, Victoria	370.0	170.0	[17]2	93.0	147.0	....	83.0	....	....	182.0	....
Gippsland No. 2, Longford, Victoria	367.0	170.0	7	93.0	147.0	....	83.0	....	....	182.0	....
Gippsland No. 3, Longford, Victoria	370.0	170.0	7	93.0	147.0	....	83.0	....	....	182.0	....
Santos Ltd.—Moomba	900.0	670.0	[12]1-[21]5 6-7	....	....	....	....	....	941.0	1,344.0	....
Port Bonython	....	....	3&5	....	482.0	....	220.0	....	....	892.0	[11]611.0
Total	**2,007.0**	**1,180.0**		**279.0**	**923.0**	....	**469.0**	....	**941.0**	**2,782.0**	**611.0**

AUSTRIA

Company, plant, location	Gas capacity	Gas throughput	Process/ Condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
OeMV AG—Piberbach, Upper Austria	2.2	0.4	...	....	....	....	....	....	....	....	....
Roseldorf, Lower Austria	3.5	[illegible].2	...	....	....	....	....	....	....	....	....
Total	**5.7**	**1.6**		....	....	....	....	....	....	....	....

Company, plant, location*	MMcfd Gas capacity	MMcfd Gas throughput	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
BAHRAIN											
Bahrain National Gas Co.—Jebel Al-Bukhan	**168.0**	**155.0**	[17]2	....	**117.8**	....	**100.8**	....	....	**144.9**	....
BANGLADESH											
Bangladesh Gas Fields CL—Titas, Brahmanbaria (6 plants)	340.0	40	1	....	....	....	....	....	....	1.3	[3]6.6 [11]8.2
Habiganj (2 plants)	120.0	40	1	....	....	....	....	....	....	....	[11]0.1
Total	**460.0**	**80.0**		....	....	....	....	....	....	**1.3**	**14.9**
BOLIVIA											
Yacimientos Petroleos Fiscales Bolivanos—											
Colpa plant, Andres Ibanez Province, Santa Cruz	192.0	18.0	[11]1	....	....	....	....	7.8	....	5.7	[11]11.0
*Rio Grande plant, Cordillera Province, Santa Cruz	282.0	159.3	[11]1	....	1.4	2.5	....	153.9	....	55.8	[11]125.9
Total	**474.0**	**177.3**		....	**1.4**	**2.5**	....	**161.7**	....	**61.5**	**136.9**
BRAZIL											
Petrobrás—Candeias, Bahia	74.1	70.6	[42]2	....	....	....	....	....	119.2	....	....
Catu, Agua Grande, Bahia	55.8	49.4	[42]2	....	....	....	....	....	103.2	....	....
Guamaré, Rio Grande do Norte	70.6	45.0	[42]2	....	....	....	....	113.0	....	20.8	....
Lagoa Parda, Espírito Santo	5.7	5.3	3	....	....	....	....	5.6	....	2.0	....
Reduc I, Rio de Janeiro	70.6	68.3	[42]2	....	....	....	....	122.6	....	20.9	....
Sergipe	92.6	70.6	[42]2	....	....	....	....	158.5	....	45.9	....
Total	**369.4**	**309.2**		....	....	....	....	**399.7**	**222.4**	**89.6**	....
BRUNEI											
Brunei Shell Petroleum CL—*Seria	48.0	40.0	1	....	12.5	....	....	....	37.1	....	....
Brunei LNG Sendirian Berhad—Darussalam	950.0	779.0	6	....	7.4	....	....	....	49.0	238.0	....
Total	**998.0**	**819.0**		....	**19.9**	....	....	....	**86.1**	**238.0**	....
Canada											
Alberta											
Alberta Natural Gas CL—*Cochrane, ne¼ 16-26-4 5w5m	1,025.0	843.0	7	1,308.0	....	....	....	....	476.0	....	....
Altana Exploration Co.—Caroline, 12-36-34-6-w5m	13.0	7.0	[17]2	....	....	....	....	....	6.6	4.5	....
Monitor, 10-3-35-4-w4m	9.3	3.5	4	....	....	....	....	....	....	....	....
Niton, 10-16-55-13-w5m	5.0	1.0	3	....	....	....	....	....	0.5	2.2	....
Saddle Lake, 16-26-57-13-w4m	5.0	1.1	4	....	....	....	....	....	....	....	....
Altex Resources Ltd.—Delburne, LSD 10-8-37-23 w4m	18.0	5.5	3-4	....	....	....	....	....	5.6	....	....
Penhold, LSD 10-30-36-27 w4m	6.5	2.7	3-4	....	....	....	....	....	2.8	....	....
Amoco Canada Petroleum CL—											
*Ante Creek-1, nw 18-65-23 w5m	10.0	5.0	3-4 [21]5	....	....	....	....	....	11.7	....	....
Ante Creek 4-13, LSD 4 13-65-24 w5m	3.0	1.0	[6]5	....	....	....	....	....	....	0.2	....
Ante Creek Dunvegan-3, LSD 10 4-66-23 w4m	10.0	2.5	3-4	....	....	....	....	....	1.8	....	....
Bigoray, 6-28-51-8 w5m	13.0	5.0	[19]1-3	....	....	....	....	....	....	1.0	....
*Bigoray 13-9, 13-9-52-8 w5m	5.0	1.1	3-4	....	....	....	....	....	6.4	....	[11]1.9
Bigstone D-3, sw¼ 10-61-22 w5m	49.0	37.0	[29]1-3	....	....	....	....	....	....	....	....
Bigstone Dunvegan, se 10-61-22 w5m	18.0	11.0	3	....	....	....	....	....	20.6	....	....
Cache, 1-32-59-13 w4m	15.0	14.4	[11]1-4	....	....	....	....	....	....	....	....
*D-1, East Crossfield, n½ 14-28-1 w5m	110.0	65.0	[19]1 3-4	....	....	....	....	....	....	2.6	....
East Crossfield, ne¼ 14-28-1 w5m	35.0	22.0	3-4	....	....	....	....	....	12.0	....	....
Fir, ne¼ 32-58-21 w5m	47.5	16.0	[11]1	....	....	....	....	....	....	....	[11]2.6
Frenman, 11-21-64-9 w4m	12.5	2.5	[11]1-4	....	....	....	....	....	....	....	....
Granada, Pembina, LSD 2 18-52-11 w5m	30.0	16.0	3-4	....	....	....	....	....	22.1	....	....
Hylo, 12-65-15 w4m	3.3	2.5	[11]1-4	....	....	....	....	....	....	....	....
Josephine, ne¼ 1-83-10 w6m	50.0	0.9	3	....	....	....	....	....	....	4.4	....
Kirby, nw 25-73-5 w4m	45.0	14.0	[11]1-4	....	....	....	....	....	....	....	....
Lanaway, 13-5-36-4 w5m	15.0	2.5	[11]1-4	....	....	....	....	....	1.1	....	....
Leismer, 21 77-8 w5m	27.0	25.0	[11]1-4	....	....	....	....	....	....	....	....
Lobstick, sw¼ 17-50-7 w5m	35.0	8.0	3-4	....	....	....	....	....	9.2	....	....
Markerville, 10-6-36-2 w5m	15.0	2.0	[11]1	....	....	....	....	....	....	....	....
Marten Hills, 18-76-25 w4m	133.0	40.0	[11]1 4-[21]5	....	....	....	....	....	....	....	....
Mitsui, 30-72-4 w5m	23.0	3.5	3-4&6	....	....	....	....	....	24.2	....	....
*Nipisi, 4 11-80-8 w5m	25.0	21.5	[19]1 4-[21]5	....	....	....	....	....	106.0	....	[11]4.4
Pembalta 1, ne¼ 25-48-7 w5m	8.0	6.0	3-4	....	....	....	....	....	19.9	....	....
Pembalta 2, e½ 15-47-7 w5m	16.0	11.0	3-4	....	....	....	....	....	29.0	....	....
Pembalta 5, sw¼ 2-48-8 w5m	7.0	1.5	3-4	....	....	....	....	....	7.6	....	....
Pembalta 7, sw¼ 34-47-9 w5m	14.0	9.0	3-4	....	....	....	....	....	33.0	....	....
Pembalta 8, sw¼ 5-49-9 w5m	11.0	3.0	3-4	....	....	....	....	....	10.5	....	....
*Ricinus, 11-30-35-8 w5m	115.0	92.0	4-7	....	....	....	....	....	213.0	....	....
Sedalia, 5-26-30-4 w4m	8.5	2.3	3-4	....	....	....	....	....	....	<0.1	....
South Wapiti, ne 36-67 9 w6m	300.0	95.0	[28]5	....	....	....	....	....	....	30.6	....
St. Albert, 14 36-53-26 w4m	2.0	0.4	[2]1-3-4	....	....	....	....	....	4.1	....	....
Three Hills Creek, nw½ 13-35-26 w4m	12.0	4.0	3-4	....	....	....	....	....	5.1	....	[11]0.4
Waskahigan, ne7-64-23 w5m	16.3	4.8	[28]5	....	....	....	....	....	....	0.8	....

Company, plant, location	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
	Gas capacity	Gas through-put	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
*West Whitecourt, 8-17-60-15 w5m	421.6	169.0	[5]1-3-4	....	....	....	....	....	....	72.8	....
Worsley, 7-22-87-7 w6m	45.0	0.4	[17]5	....	....	....	....	....	....	3.6	....
Anderson Exploration Ltd.—Bruce, 10-1-48-15 w4m	3.0	2.0	4	....	....	....	....	....	....	....	....
Buff Coulee, 11-12-47-7 w4m	6.6	5.5	4	....	....	....	....	....	....	....	....
Dunvegan, 15-3-81-4 w6m	240.0	150.0	3&4	....	....	....	....	....	....	....	....
Hines, LSD 6-35-85-3 w6m	5.0	4.0	4-5	....	....	....	....	....	....	....	....
Dixonville, 8-14-85-25 w4m	4.0	3.2	4	....	....	....	....	....	....	....	....
Kitscoty, 10-17-51-3	2.0	1.2	4	....	....	....	....	....	....	....	....
Lloydminster, 7-11-51-1 w4m	2.0	1.5	4.	....	....	....	....	....	....	....	....
Mirage, 10-2-79-8 w4m	1.5	1.0	3-4	....	....	....	....	....	....	....	[11]0.4
Bumper Development Corp. Ltd.—Bumper Crystal, LSD 16-36-45 w4m	4.0	1.5	3	....	....	....	....	....	4.0	....	....
Canadian Hunter Exploration Ltd.—Basset Lake 1, ne¼ 29-104-2 w6m	7.0	3.0	[28]5	....	....	....	....	....	....	42.1	....
Basset Lake 3, ne¼ 29-106-5 w6m	4.0	3.0	3	....	....	....	....	....	....	70.1	....
Elmworth Deep Cut, se¼ 8-70-11 w6m	275.0	134.0	7	....	....	....	....	240.7	....	....	....
Elmworth Shallow Cut, se¼ 8-70-11 w6m	300.0	159.0	[28]5	....	....	....	....	....	....	20.3	....
Haig Lake 2, nw¼ 33-104-5 w6m	5.4	2.3	3	....	....	....	....	....	....	56.3	....
Karr, nw¼ 10-65-2 w6m	50.0	25.1	3	....	....	....	....	....	....	42.4	....
South Gold Creek, nw¼ 15-66-5 w6m	15.0	1.3	[31]1	....	....	....	....	....	....	....	....
Canadian Occidental Petroleum Ltd.—											
Keystone, 5 35-46-4 w5m	10.0	4.0	2	....	2.0	....	1.8	....	....	1.9	....
Mazeppa, se¼ 35-19-28 w4m	42.4	17.7	[29]2	....	....	....	....	....	....	....	[11]17.4
Paddle River, LSD 13, 6-57n-8 w5m	...	...	[5]1-7	10.9	16.9	....	9.5	....	....	7.3	....
Petrogas Processing, Crossfield, s½ 2-26-29 w4m	210.0	74.0	[5]1	....	34.3	....	24.3	....	....	44.9	....
Canterra Energy Ltd.—											
*Cessford, Special Area 3, LSD 4-6-24-10 w4m	12.0	3.0	[27]5	....	....	....	....	....	....	....	....
Judy Creek, 8-24-63 I0 w5m	4.5	1.9	3	....	....	....	....	....	0.6	....	....
Nordegg River, w½ 10-44-12 w5m	66.7	21.7	[5]1	....	....	....	....	....	....	....	[11]9.7
North Oyen, 11-17-29 w4m	4.0	1.0	[27]5	....	....	....	....	....	....	....	....
Okotoks, MD 31, Foothills, sw¼ 27-20-29 w4m	34.8	27.0	[19]1	....	....	....	....	....	....	....	[11]2.4
Rainbow, 10-10-109-8 w6m	93.0	85.4	[5]1	....	....	....	....	....	586.3	....	....
Ram River, 2-37-10 w5m	630.0	334.0	[24]2-4 [5]1	....	....	....	....	....	....	....	[11]35.8
Sinclair, 2-14-72-12 w6m	10.0	8.5	3	....	....	....	....	....	0.6	....	....
Wayne Rosedale, 12-4-28-20 w4m	15.0	7.0	3-4	....	....	....	....	....	2.0	....	[11]1.0
Wimborne, 16-5-35-26 w4m	3.8	2.0	3	....	....	....	....	....	....	0.6	....
Champlin Canada Ltd.—											
Baptiste Lake, 14-34-65-24 w4m	22.0	6.0	[5]1	....	....	....	....	....	....	....	....
Cynthia Pembina, 9-16-51-11 w5m	1.0	0.7	3	....	....	....	....	....	2.1	....	....
Chevron Canada Resources Ltd.—											
*Bigoray, 10-7-51-9 w5m	3.0	...	3-4	....	....	....	....	....	....	....	....
*Brazeau, 16-35-48-12 w5m	10.0	9.4	3-4	....	....	....	....	20.1	....	....	....
Ferrybank, 14-11-45-27 w4m	5.2	4.5	3-4	....	....	....	....	3.5	....	<0.1	....
Joffre, 14-36-38-27 w4m	9.0	1.9	3-4	....	....	....	....	2.0	....	....	....
*Kaybob South No. 3, 15-59-18 w5m	445.0	362.6	[17]2-7	....	....	....	....	233.0	77.5	260.5	....
*Mitsue, 11 30-72-4 w5m	30.0	...	[17]2-4	....	....	....	....	....	....	....	....
North Gilby, 1-24-41-3 w5m	23.0	11.6	3&[28]5	....	....	....	....	10.2	....	....	....
Princess, 12-12-20-12 w4m	10.0	3.7	[28]5	....	....	....	....	....	....	0.6	....
Sylvan Lake, 1-21-38-2 w5m	31.5	20.4	[17]2	....	16.6	....	12.9	....	....	10.4	....
*West Pembina, 11-22-49-12 w5m	29.7	20.0	3-4	....	....	....	....	33.5	....	67.8	....
Cooperative Energy Development Corp.—											
Blackie, 06-15-20-27 w4m	4.0	1 2	3-4	....	....	....	....	....	1.0	....	....
Carrot Creek, LSD 10-16-53-13 w5m	6.0	3.3	3-4	....	....	....	....	....	4.8	....	....
Cessford, LSD 7 5-26-I2 w4m	1.0	0.5	3-4	....	....	....	....	....	....	0.1	....
Edson 1-13, LSD 1-13-54-19 w5m	10.0	8.6	3-4	....	....	....	....	....	9.0	....	....
Edson North, LSD 16-15-53-18 w5m	8.0	3.4	3-4	....	....	....	....	....	2.5	....	....
Edson South, 10-30-52-17 w5m	1.5	1.2	3-4	....	....	....	....	0.3	1.0	....	....
Medicine River, LSD 10-14-39-3 w5m	6.0	2.4	3-4	....	....	....	....	....	2.7	....	....
DeKalb Petroleum Corp.—Blueberry Mountain, 11-16-82-7 w6m	10.0	5.0	5	....	....	....	....	....	....	1.5	....
Bingley, 2-36-40-7 w5m	2.6	2.6	6	....	....	....	....	....	4.0	....	....
Garrington, 13-5-34-3 w5m	12.0	5.0	7	....	....	....	....	....	6.5	....	....
Leafland, 15-31-39-5 w5m	23.5	10.0	7	....	....	....	....	....	13.0	13.0	....
Nevis, 12-7-41-22 w4m	27.0	10.0	[11]1	....	....	....	....	....	....	....	....
Dome Petroleum Ltd.—Amisk, 4-22-41-8-w4m	10.3	3.4	3-4-5	....	....	....	....	....	....	0.1	....
Athabasca East, 9-23-66-22 w4m	9.0	3.2	4	....	....	....	....	....	....	....	....
Athabaska North, 5-18-67-22 w4m	6.0	2.2	4	....	....	....	....	....	....	....	....
Atlee-Buffalo, 12-21-20-8 w4m	4.0	1.0	4	....	....	....	....	....	....	....	....
Arrowwood North, 4-15-21-25 w4m	7.9	4.0	4	....	....	....	....	....	....	....	....
Arrowwood South, Hussar, 1-7-20-25 w4m	24.9	5.2	4	....	....	....	....	....	....	....	....
Bolloque, 16-23-64-26 w4m	10.0	2.7	4	....	....	....	....	....	....	....	....
Bouvier, 15-29-70-24 w4m	5.2	0.7	4	....	....	....	....	....	....	....	....
Braeburn, 16-19-77-10 w6m	5.6	0.1	4	....	....	....	....	....	....	....	....
Brazeau River, 1-46-14 w5m	218.0	79.0	1-3-4	....	....	....	....	33.3	....	....	....
Brownfield, se¼-2-39-12 w4m	19.9	14.6	4-5	....	....	....	....	....	....	1.6	....
Caroline North, 1-11-35-6 w5m	52.2	27.5	3-4	....	....	....	....	....	30.2	25.1	....
Caroline South, 3-20-34-4 w5m	53.6	29.7	3&5	....	18.1	....	17.6	....	....	27.8	....
*Castor East, 4-3-38-13 w4m	19.9	7.3	4-5	....	....	....	....	....	....	0.7	....
Cessford, 2-8-24-12 w4m	125.0	26.6	3-4	....	....	....	....	....	....	3.1	....
Cherhill, 4-24-56-5 w5m	4.5	2.8	3	....	....	....	....	....	1.9	....	....
Chinchaga, 1-24-96-5 w6m	89.0	46.2	3-4	....	....	....	....	....	46.8	73.0	....
Choice, 13-17-40-9 w4m	9.9	1.7	4-5	....	....	....	....	....	....	0.1	....
Craigend, 16-1-64-13 w4m	5.0	1.5	4	....	....	....	....	....	....	....	....
Consort, 8-19-36-5 w4m	70.6	21.6	4	....	....	....	....	....	....	8.0	....
Cutbank, 7-16-62-8 w6m	70.0	15.8	3-4	....	....	....	....	....	6.6	....	....
Duvernay, 11-11-55-12 w4m	14.6	2.0	4	....	....	....	....	....	....	....	....
Edmonton Ethane, sw¼-4-52-25 w4m	315.0	207.1	7	344.8	....	....	....	....	283.3	....	....
Edwand, 7-12-62-17 w4m	2.5	0.5	4	....	....	....	....	....	....	....	....
Edson, 3&4 11-53-18 w5m	372.0	124.7	1-3-4	....	....	....	....	....	....	38.0	....
Elk River, 4-6-47-12 w5m	7.0	1.8	3	....	....	....	....	....	....	0.6	....

Company, plant, location	MMcfd		Process/condition method	Production—1,000 gal/day (Average based on the past 12 months)							
	Gas capacity	Gas through-put		Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Empress Ethane 1, sw¼ 12-20-1 w4m	1,500.0	1,304.0	7	716.8	....	....	....	....	541.1	....	....
Empress Ethane 2, sw¼ 12-20-1 w4m	2,000.0	592.0	7	451.9	....	....	....	....	292.7	....	....
Enchant, 11-9-14-16 w4m	7.0	4.0	4	....	....	....	....	....	....	....	....
Flat Lake, 11-17-67-18 w4m	6.5	0.6	4	....	....	....	....	....	....	....	....
Garrington, 11-17-34-3 w5m	19.9	7.9	3-4 5&7	....	....	....	....	22.1	2.5	....	....
Gilby North, 9-12-41-4 w5m	4.6	1.6	3-4	....	....	....	....	....	....	0.7	....
Gilby South, 8-26-40-3 w5m	9.0	3.3	5	....	....	....	....	....	....	1.6	....
Goodfare, sw 19-72-11 w6m	69.5	43.4	3	....	....	....	....	....	12.7	....	....
Haight Mundare, 6-8-53-16 w4m	7.0	2.6	4	....	....	....	....	....	....	....	....
Hilda, 16-22-17-2 w4m	6.0	2.0	4	....	....	....	....	....	....	....	....
Hollow, 10-22-61-20 w4m	10.0	2.3	4	....	....	....	....	....	....	....	....
Hotchkiss MD, 11-29-94-25 w5m	191.1	9.6	4	....	....	....	....	....	....	....	....
Hotchkiss North, 2-35-94-2 w6m	20.6	8.9	4	....	....	....	....	....	....	....	....
Hotchkiss South, 9-34-93-01 w6m	22.1	5.0	4	....	....	....	....	....	....	....	....
Inland, 4-25-51-15 w4m	7.4	1.6	3-4	....	....	....	....	....	....	<0.1	....
Inland South, 15-31-50-14 w4m	9.0	3.9	4	....	....	....	....	....	....	....	....
Jenner, 10-34-19-9 w4m	13.9	4.9	4	....	....	....	....	....	....	....	....
Jenner-Musketeer, 10-34-19-09 w4m	13.9	3.7	4	....	....	....	....	....	....	....	....
*Kaybob South 1, 1-12-62-20 w5m	226.0	122.4	1-3-4	....	77.7	....	59.7	....	....	120.6	....
*Kaybob South 2, 3&4 12-62-20 w5m	170.0	108.7	1-3-4	....	....	....	....	....	125.8	143.6	....
Keystone, 6-15-48-3 w5m	7.4	3.9	3-4	....	....	....	....	....	5.3	....	....
Kirby Lake, 12-8-74-5 w5m	44.8	13.5	4	....	....	....	....	....	....	....	....
Lavoy, 11-12-52-14 w4m	15.9	13.2	4	....	....	....	....	....	....	....	....
Lone Pine Creek, 6-23-30-28 w4m	74.0	22.4	3-4	....	....	....	....	....	....	19.6	....
Mannville, 3-27-50-9 w4m	33.9	6.5	4	....	....	....	....	....	....	....	....
Medicine Hat, 2-27-15-4 w4m	12.0	10.4	4	....	....	....	....	....	....	....	....
Medicine Hat North, 1-7-16-2 w4m	4.5	3.0	1&4	....	....	....	....	....	....	....	....
Medicine River, 6-16-38-4 w5m	8.0	3.7	3	....	....	....	....	....	2.9	....	....
Meanook, 6-10-63-22 w4m	5.2	4.0	4	....	....	....	....	....	....	....	....
Monitor, 2-3-35-5 w4m	6.5	0.8	1&4	....	....	....	....	....	....	....	....
Patricia, 13-5-21-12 w4m	7.9	3.1	4	....	....	....	....	....	....	....	....
Prosperity, 11-28-67-19 w4m	6.0	4.5	1&4	....	....	....	....	....	....	....	....
Provost, ne¼-19-36-5 w4m	80.0	50.0	5	....	....	....	....	....	....	3.3	....
Provost East, 3-30-37-2 w4m	9.5	5.2	4-5	....	....	....	....	....	....	0.7	....
Ranfurly, 14-32-50 12 w4m	15.9	3.4	4	....	....	....	....	....	....	....	....
Steele, 10-19-77-24 w4m	9.0	2.2	5	....	....	....	....	....	....	....	....
Sturgeon Lake South, se 2-69-22 w5m	20.0	13.0	3-4	....	....	....	....	....	26.1	....	....
Sundance, 6-25-54-21 w5m	15.5	14.9	3-4	....	....	....	....	....	....	10.5	....
Sylvan Lake, 10-12-38-3 w5m	4.0	1.9	4	....	....	....	....	....	1.6	....	....
Sylvan Lake, 14-32-37-3 w5m	64.7	24.5	3	....	19.9	....	10.3	....	....	9.3	....
Tangent, 16-20-80-24 w5m	7.5	1.1	3	....	....	....	....	....	....	....	....
Tower North, 6-14-76-16 w4m	7.0	7.3	4	....	....	....	....	....	....	....	....
Travers, 16-13-14-18 w4m	15.0	6.7	3-4	....	....	....	....	....	....	0.1	....
Twining, sw 31-32-24 w4m	8.3	6.0	3-4	....	....	....	....	....	....	5.0	....
Valhalla, 1-29-75-9 w6m	31.4	14.5	3	....	....	....	....	....	....	2.1	....
Verger, 6-25-23-16 w4m	2.0	0.1	3	....	....	....	....	....	....	....	....
Vulcan, se¼-24-15-22 w4m	55.2	39.6	3-4	....	....	....	....	....	7.0	....	....
Wandering River, 9-30-72-14 w4m	11.9	1.9	4	....	....	....	....	....	....	....	....
Warwick, 10-18-53-14 w4m	8.4	2.6	4	....	....	....	....	....	....	....	....
West Fox Creek, 13-22-60-19 w5m	15.7	4.5	3-4	....	....	....	....	....	....	....	....
West Paddle River, 11-10-56-11 w5m	17.7	7.8	3	....	....	....	....	6.2	....	1.4	....
Whitelaw, 13-20-81-1 w6m	10.0	2.1	4	....	....	....	....	....	....	....	....
Wildunn, 7-9-12 w4m	10.0	4.6	3	....	....	....	....	....	....	0.3	....
*Willesden Green, 27-42-8 w5m	40.0	27.0	3-7	....	....	....	....	....	30.4	....	....
Zama, nw 12-116-6 w6m	25.2	9.7	3	....	....	....	....	....	13.4	4.7	....
Enron Oil Canada Ltd.—											
Highvale, 10-4-51-4 w5m	8.0	7.5	3	....	....	....	....	....	1.9	....	....
Thunder, 9-20-59-6 w5m	7.0	7.0	3	....	....	....	....	....	1.9	....	....
Esso Resources Canada Ltd.—Boundary Lake South, Floral, 1-14-85-13 w6m	17.0	3.1	4	....	....	....	....	....	....	0.8	....
Comet Galaxy, Rainbow Lake, 12-23-110-7 w6m	8.0	5.8	3	....	....	....	....	....	....	....	....
*Devon—1 and 2, 34-50-26 w4m	....	....	†	....	(138.7)	....	(89.8)	....	....	(69.4)	....
Euerdell, Ferrier 14-20-38-7 w5m	10.0	3.8	3-4	....	3.5	....	2.2	....	....	1.1	....
Golden Spike, 16-22-51-27 w4m	126.0	126.0	4	....	20.3	....	13.6	....	....	10.1	....
Joffre D2, Lacombe, ne¼ 17-39-26 w4m	7.5	3.0	3-4	....	2.8	....	1.7	....	....	0.5	....
Judy Creek, 10-25-64-11 w5m	265.0	153.6	1-2-3 4-5&7	....	....	....	....	....	723.4	....	....
Leduc, Devon, 34-50-26 w4m	35.0	29.2	3	....	17.2	....	18.2	....	....	9.1	....
Niton, LSD 14-18-54-12 w5m	50.0	30.7	3	....	3.8	....	3.8	....	....	5.1	....
Quirk Creek, s½ 4-21-4 w5m	90.0	33.3	2	....	14.4	....	10.7	....	....	13.8	....
Redwater, LSD 8 29-57-21 w4m	22.1	10.2	2	....	23.0	....	18.1	....	....	11.1	....
General American Oils Ltd.—*Sylvan Lake, LSD 13-25-37-3 w5m	32.0	20.0	3	....	....	....	....	....	26.0	....	....
Goliad Resources Ltd.—Bantry, LSD 4 33-17-12 w4m	5.0	4.0	3	....	....	....	....	....	2.5	....	....
Gulf Canada Corp.—											
Baptiste, LSD 5-28-67-22 w5m	10.4	3.8	4-[13]5	....	....	....	....	....	....	....	....
Baptiste Island Lake	5.2	1.5	[19]1-4	....	....	....	....	....	....	....	....
Blood Magrath, 7-8-6-22 w4m	11.5	1.9	3	....	....	....	....	0.1	....	....	....
Buffalo Lake North, LSD 11-24-41-21 w4m	7.1	1.3	3	....	....	....	....	....	....	0.1	....
Hanna, LSD 2-36-31-14 w4m	3.0	0.9	3-4	....	....	....	....	0.2	....	....	....
Hanlan-Robb, ne¼ 2-49-20 w5m	300.0	74.5	[19]2	....	....	....	....	3.0	....	....	....
Morrin-Ghost Pine, LSD 1, 8-11-31-21 w4m	109.5	41.9	3	....	....	....	....	36.1	....	0.3	....
Nevis, ne¼ 9-33-38-22 w4m	125.0	42.4	[17]2-4	....	80.2	55.0	....	....	....	37.7	....
North Sibbald, LSD 6-9-31-1 w4m	2.6	3.8	4-[13]5	....	....	....	....	....	....	....	....
Rimbey, LSD s½ 5-44-1 w5m	421.0	182.1	2	....	225.1	126.3	....	....	....	169.4	....
Strachan, LSD 11-35-37-9 w5m	275.0	103.6	7	....	....	....	....	87.4	....	109.9	....
Swalwell, LSD 6-33-29-24 w5m	4.0	1.3	6	....	....	....	....	....	....	....	....
Valhallah, 13-21-76-9 w6m	4.0	1.9	4	....	....	....	....	....	....	....	....
Home Oil CL—Bashaw, 8-10-42-22 w4m	11.9	3.6	5	....	....	....	....	....	....	....	[11]0.1
Carstairs-Crossfield, 3-3-30-2 w5m	280.0	59.0	2	....	50.9	....	33.1	....	....	55.0	....
Cossack, 7-17-60-17 w4m	6.0	2.6	4	....	....	....	....	....	....	....	....
Leismer, 6, 7-77-7 w4m	35.0	21.5	4	....	....	....	....	....	....	....	....

Company, plant, location	MMcfd Gas capacity	Gas through-put	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Marten Hills South-1, 14-22-74-24 w4m	21.0	9.5	4	....	....	....	....	....	....	....	....
Marten Hills South-2, 14-29-74-25 w4m	8.0	0.6	4	....	....	....	....	....	....	....	....
Retlaw, 12-2-13-19 w4m	10.0	2.9	5	....	....	....	....	....	....	0.4	....
South Elkton, 2-3-31-4 w5m	4.4	0.6	2	....	....	....	....	....	....	0.5	....
Tieland, 5-14-67-2 w5m	10.0	3.6	4	....	....	....	....	....	....	....	....
ICG Resources Ltd..—											
Acheson, sw¼ 2-53-26 w4m	7.5	7.5	3	....	27.0	....	14.0	....	....	8.6	....
Chard, 16-1-79-5-w4m	5.3	5.3	4	....	....	....	....	....	....	....	....
Cowpor, 11-19-80-4w4m	12.0	7.0	4	....	....	....	....	....	....	....	....
Gilby, 10-10-041-03-w5m	12.0	6.0	[28]5	....	....	....	....	....	1.7	....	....
Hilda, 4-26-17 2 w4m	5.5	2.0	4	....	....	....	....	....	....	....	....
Leafland, 13-16-040-05 w4m	5.5	5.5	6	....	....	....	....	8.0	....	....	....
Many Islands, 4-16-14-1 w4m	28.0	20.0	4	....	....	....	....	....	....	....	....
Tweedie, se½ 19-68-12 w4m	15.0	7.5	4	....	....	....	....	....	....	....	....
Kerr-McGee Corp.—Craigmyle, 13-35-32-17 w4m	6.2	4.3	[11]2	....		....	....	....	....	....	....
Elnora, 5-19-35-22 w4m	18.0	7.0	[11]2	....	....	....	....	....	....	....	....
Ferrybank, 3-31-44-27 w4m	8.5	8.5	[11]2	....	....	....	....	....	....	....	....
Prevo, 10 2-39-1 w5m	1.0	0.5	[11]1	....	....	....	....	....	....	....	....
Rich, 16-22-35-21 w4m	3.0	2.0	[11]2	....	....	....	....	....	....	....	....
Lariat Oil & Gas Ltd.—Three Hills, LSD 11-16-31-23 w4m	5.0	2.0	2	....	....	....	....	....	0.8	....	....
Mobil Oil Canada Ltd.—*Carson Creek, 4 23-61-12 w5m	70.0	65.0	[17]2-4	....	72.7	....	33.0	....	....	39.6	....
Duhamel, 3 32-46-21 w4m	3.7	0.8	3-4	....	....	....	....	....	2.4	....	....
*Harmattan, 27-31-4 w5m	504.0	290.0	[17]2-4	....	145.4	....	105.7	....	....	178.4	....
Liege, 1-16-92-21 w4m	30.0	5.3	4	....	....	....	....	....	....	....	....
Lone Pine Creek South, 27-29-28 w4m	35.0	10.7	3	....	....	....	....	....	....	4.8	....
Pembalta IV, 16 16-49-8 w5m	11.0	8.2	3-4	....	....	....	....	....	4.0	....	....
Teepee Creek, Grande Prairie, LSD 7-2-74-4 w6m	18.5	7.0	3	....	....		....	....	....	1.7	....
Three Hills, 4 33-31-23 w4m	30.0	11.8	3-4	....	....		....	11.4	....	4.1	....
Willisden Green, 8 29-40-6-5 w5m	0.9	0.7	3-4	....	....	....	....	....	0.8	....	....
*Wimborne, 4 12-34-26 w4m	30.0	28.0	3-4	....	....	....	....	....	....	....	....
Wintering Hills, 16 7-24-16 w4m	6.0	1.3	3-4	....	....	....	....	....	0.1	....	....
Murphy Oil CL—Glendon, Sugden-Grand Rapids, 03-16-61-8 w4m	15.0	9.0	4	....	....	....	....	....	....	....	....
Princess No. 1, 14-23-19-10 w4m	7.5	4.5	4	....	....	....	....	....	....	....	....
Princess No. 2, 08-16-20-10 w4m	7.5	4.5	4	....	....	....	....	....	....	....	....
Norcen Energy Resources Ltd.—Bigoray, Parkland 31, 10-22-51-8 w5m	3.0	0.8	4	....	....	....	....	....	....	0.4	....
Bruce, Beaver 9, 2-6-47-15 w4m	30.0	4.5	1&4	....	....	....	....	....	....	<0.1	....
Ferrier, Radial Lake, se¼ 2-34-40-9 w5m	20.6	7.6	2	....	3.3	....	2.0	....	....	3.5	....
Fort Saskatchewan, se¼ 3-55-22 w4m	35.0	30.0	7	....	....	....	....	....	57.0	....	....
Gilby, Lacombe, 10-8-41-1 w5m	3.4	0.4	2&4	....	....	....	....	0.4	....	....	....
Judy Creek, 12-19-64-1 w5m	2.0	1.4	[28]5	....	....	....	....	....	....	0.3	....
Kessler, 14-5-39-8 w4m	6.0	1.2	4	....	....	....	....	0.3	....	....	....
McLeod River, Dist. 14, 7-34-54-14 w5m	7.0	3.8	3	....	....	....	....	3.4	....	....	....
Netook-Olds, Mountain View 17, 16-21-33-1 w5m	1.9	1.5	1&4	....	....	....	....	....	....	15.5	....
Provcst-Bodo, Provost 52, ne¼ 16-31-37-2 w4m	6.0	1.5	4	....	....	....	....	....	....	0.1	....
St. Albert, Sturgeon Dist., se¼ 3-26-54-25 w4m	20.0	14.5	[17]2	....	6.3	....	4.2	....	....	4.0	....
North Canadian Oils Ltd.—											
Atlee Buffalo, 5-22-20-4 w4m	4.0	3.5	4	....	....	....	....	....	....	....	....
Bantry, 5-8-19-13 w4m	18.0	12.0	4	....	....	....	....	....	....	....	....
Beaverhill Lake, 4-17-52-18 w4m	3.0	2.5	[11]1	....	....	....	....	....	....	....	....
Bellshill Lake, 7-21-42-12 w4m	4.0	3.5	[11]1	....	....	....	....	....	....	....	....
Buffalo South, 4-22-20-5 w4m	4.0	3.5	4	....	....	....	....	....	....	....	....
Canard, 9-30-57-8 w4m	12.0	12.0	[11]1	....	....	....	....	....	....	....	....
Conlac, Medicine Hat, 14-14-14-3 w4m	25.0	12.0	4	....	....	....	....	....	....	....	....
Corbett Creek, 13-26-61-8 w5m	12.0	0.5	3-4	....	....	....	....	....	....	....	....
Delia, 1-13-32-19 w4m	16.0	15.0	4	....	....	....	....	....	....	....	....
Dinant, Bruce, 1-26-45-19 w4m	20.0	20.0	[11]1	....	....	....	....	....	....	....	....
Fenn Big Valley, 8-27-35-19 w4m	8.0	7.0	3-4	....	....	....	....	5.0	....	....	....
Garden-Plains, 5-15-33-13 w4m	10.0	3.5	1&4	....	....	....	....	....	....	....	[11]0.3
Hatton 11-36, 11-36-14-29 w3m	8.0	8.0	4	....	....	....	....	....	....	....	....
Hilda, Medicine Hat, 9-34-18-2 w4m	7.0	3.5	4	....	....	....	....	....	....	....	....
Hilda Schuler, 13-9-17-1 w4m	5.0	3.4	4	....	....	....	....	....	....	....	....
Hilda West, 4-19-18-1 w4m	3.5	2.7	4	....	....	....	....	....	....	....	....
Jarrow, 8-15-45-11 w4m	4.0	3.5	[11]1	....	....	....	....	....	....	....	....
Knopcik, 9-10-74-11 w6m	15.0	5.0	3-4	....	....	....	....	....	3.5	....	....
Minburn, 8-24-51-10 w4m	7.0	7.0	[11]1	....	....	....	....	....	....	....	....
Morinville, 11-15-55-25 w4m	2.5	1.4	[2]1	....	....	....	....	....	....	....	....
North Mannville, 13-16-53-10 w4m	7.0	6.0	[11]1	....	....	....	....	....	....	....	....
North Plain Lake, 13-31-54-11 w4m	14.0	14.0	[11]1	....	....	....	....	....	....	....	....
Schuler, 1-28-16-1 w4m	3.5	2.5	4	....	....	....	....	....	....	....	....
Sedgewick, 4-27-44-10 w4m	3.0	1.5	[11]1	....	....	....	....	....	....	....	....
Simonette, 7-6-63-26 w5m	2.0	1.0	4	....	....	....	....	....	....	....	....
Sugden, 11-11-65-9 w4m	2.0	2.0	[11]1	....	....	....	....	....	....	....	....
Vale, Medicine Hat, 15-19-14-3 w4m	30.0	15.0	4	....	....	....	....	....	....	....	....
Viking-Kinsella, 11-17-46-8 w4m	15.0	10.0	[11]1	....	....	....	....	....	....	....	....
Warwick, 8-34-52-14 w4m	4.0	1.5	[11]1	....	....	....	....	....	....	....	....
Westlock, 13-24-61-26 w4m	9.0	6.5	3-4	....	....	....	....	....	....	....	[11]0.1
Willingdon, 11-20-55-15 w4m	18.0	10.0	[11]1	....	....	....	....	....	....	....	....
NSM Resources Ltd.—Choice, 5 27-40-10 w4m	3.0	2.0	3	....	....	....	....	....	<0.1	....	....
Redwater, Lamont, 15-16-56-20 w4m	1.0	0.1	3	....	....	....	....	....	....	....	....
Redwater, Lamont, 8-25-55-20 w4m	1.0	0.5	3	....	....	....	....	....	....	....	....
Palmer Ranch (1984) Ltd.—Pincher Creek, s½ 23-4-29 w4m	12.0	7.0	3-4	<0.1	....	....	....	....	....	4.5	....
Paloma Petroleum Ltd.—Berry, 16-21-28-13 w4m	8.4	7.0	3-4	....	....	....	....	....	....	....	[11]0.4
Hotchkiss, LSD 7 13-94-3 w6m	6.0	2.2	4	....	....	....	....	....	....	....	....

Company, plant, location	MMcfd Gas capacity	MMcfd Gas through-put	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Vegreville, 6-13-52-14 w4m	8.2	5.0	4	....	....	....	....	....	....	....	....
Viking, LSD 12 36-49-13 w4m	4.5	3.5	4	....	....	....	....	....	....	....	....
PanCanadian Petroleum Ltd.—Alderson West, 10-28-15-15 w4m	23.5	3.6	3	....	....	....	....	....	....	2.4	[11]0.3
Alderson West, 6-2-16-15 w4m	6.0	2.4	[2]1	....	....	....	....	....	....	....	....
Bassano Lathom, 10-5-22-18 w4m	25.0	5.9	[27]5	....	....	....	....	....	....	....	[11]0.8
Carseland, 16-21-22-25 w4m	12.0	1.5	3	....	....	....	....	....	....	....	[11]0.1
Countess 10-20-18-15 w4m	8.0	3.5	3	....	....	....	....	5.2	....	....	[11]1.7
Countess Makepeace, 12-33-22-18 w4m	50.0	11.4	3	....	....	....	....	....	....	....	[11]1.8
Entice, 10-7-28-23 w4m	7.0	1.4	3	....	....	....	....	....	....	....	[11]<0.1
Ferrybank, 2-1-44-28 w4m	26.0	7.9	3	....	....	....	....	....	....	....	[11]2.9
Gilby Cantex Nortun, 6-21-40-2 w5m	2.1	0.4	3	....	....	....	....	....	....	....	[11]0.2
Hussar Crowfoot, 14-1-24-22 w4m	28.0	6.9	3	....	....	....	....	2.4	....	....	[11]2.5
Long Coulee, 6-30-15-21 w4m	8.2	2.2	[illegible]	....	....	....	....	....	....	....	[11]0.6
Redland, 1-20-28-21 w4m	20.0	1.1	3	....	1.0	....	1.7	....	....	....	[11]2.9
Tide Lake, 16-10-18-10 w4m	10.0	3.5	3	....	....	....	....	....	....	....	[11]<0.1
Wayne Dalum, 5-17-27-19 w4m	19.0	5.1	[27]5	....	....	....	....	....	....	....	[11]0.8
Wintering Hills, 1-18-25-17 w4m	20.0	2.7	3	....	....	....	....	....	....	....	[11]0.5
Petro-Canada Inc.—Arrowwood, 6-31-20-24 w4m	5.0	1.3	3	....	....	....	....	....	....	0.3	....
Bellshill, 3 28-41-12 w4m	3.0	2.8	3	....	....	....	....	....	6.2	....	....
*Brazeau River, sw¼ 31-48-12 w5m	18.0	16.6	3	....	....	....	....	....	37.9	....	....
*Brazeau River, 4-31-48-12 w5m	25.0	22.2	....	....	....	....	....	33.0	....	....	....
Connorsville, 9 32-25-15 w4m	30.0	10.6	3	....	....	....	....	....	....	1.7	....
Empress, ne¼ 11-20-1 w4m	2,000.0	1,683.9	7	1,145.0	448.4	....	158.0	....	....	62.8	....
Ferrier, 9 22-39-8 w5m	8.0	4.8	3	....	....	....	....	....	5.2	....	....
Gilby No. 1064, Fina, 7 27-40-3 w5m	4.2	1.2	6	....	....	....	....	....	....	0.2	....
Gilby No. 1130, 2 27-40-3 w5m	25.0	9.2	3	....	....	....	....	....	5.1	....	....
Gilby No. 1156, Medicine River, 5-40-3 w5m	28.0	15.7	3	....	....	....	....	....	14.4	5.4	....
Gold Creek, nw¼ 13 26-67-5 w6m	48.0	10.6	3	....	....	....	....	....	....	24.1	....
Greencourt, se¼ 9 26-59-9 w5m	37.2	12.0	[28]5	....	....	....	....	....	....	2.0	....
*Kaybob, 8 9-64-19 w5m	126.3	47.0	3	....	....	....	....	....	76.4	11.4	....
Rainbow, 15 7-108-6 w6m	14.3	5.4	3	....	....	....	....	....	....	0.2	....
Sedgewick, 2 16-42-12 w4m	6.0	1.7	4	....	....	....	....	....	....	....	....
Whitecourt, Lac St. Anne, 12 26-59-11 w5m	65.0	26.9	[28]5	....	....	....	....	....	....	4.2	....
Wildcat Hills, sw¼ 6 16-26-5 w5m	125.0	28.5	[28]5	....	....	....	....	....	....	5.8	....
Phillips Petroleum Canada Ltd.—*Gilby, LSD 6-36-40-3 w5m	2.7	2.0	6	....	....	....	....		0.9	....	....
Placer Cego Petroleum Ltd.—Provost, 4-16-33-07 w4m	5.5	2.2	[24]2	....	....	....	....	....	....	....	[11]0.1
Sedalia, 9-29-31-05 w4m	8.0	6.9	[28]5	....	....	....	....	....	....	....	[11]0.1
Steveville, 2-31-22-11 w4m	22.0	3.0	[28]5	....	....	....	....	....	....	....	[11]0.2
Wood River, 16-08-43 2 w4m	5.0	1.0	[28]5	....	....	....	....	....	....	....	[11]0.2
Saratoga Processing Cl.—Coleman, 11-8-5 w5m	35.0	20.0	[19]1	....	....	....	....	....	....	....	....
Sceptre Resources Ltd.—											
Cessford, 7-17-26-14 w4m	4.2	1.7	3	....	....	....	....	....	....	....	[11]0.3
Holmberg, nw¼ 13 14-44-17 w4m	11.5	4.3	[29]2	....	....	....	....	....	....	....	[11]0.1
Huxley, 6-17-34-24 w4m	12.5	3.3	[21]5	....	....	....	....	....	....	....	[11]0.4
Judy Creek, 1-21-63-11 w5m	3.0	0.3	4	....	....	....	....	....	....	....	[11]<0.1
Stanmore, 5-1-29-12 w4m	30.0	11.4	3	....	....	....	....	....	....	....	[11]1.6
Shell Canada Resources Ltd.—Burnt Timber 1 and 2, 13-30-7 w5m	114.0	66.7	[29]1-3	....	....	....	....	....	....	7.8	....
Cranberry Lower Debolt, 4-20-96-3 w6m	14.0	8.7	[26]1-4	....	....	....	....	....	....	....	....
Cranberry Slave Point, 4-20-96-3 w6m	17.0	5.8	3-4	....	....	....	....	....	4.0	1.1	....
Gordondale, 24-79-11 w5m	14.6	2.8	[11]1-6	....	....	....	....	....	....	1.7	....
Hope Creek, 17-64-13 w5m	3.2	1.8	[29]1-3	....	....	....	....	....	....	3.2	....
House Mountain, 8-70-10 w5m	4.5	1.1	[29]1-3	....	....	....	....	....	18.3	....	....
Innisfail, 3-35-1 w5m	13.0	4.3	[19]1-3	....	....	....	....	....	....	4.1	....
Jumping Pound, nw¼ 13-25-5-w5m, se¼ 23-25-5 w5m, sw¼ 24-25-5 w5m	200.0	158.0	[29]1-2-7	71.5	41.6	....	35.8	....	....	102.9	....
Pouce Coupe, 8-80-12 w6m	3.0	0.8	[11]1-6	....	....	....	....	....	....	0.4	....
Simonette, 6-63-25 w5m	27.0	5.6	[29]1-3	....	....	....	....	....	7.4	13.8	....
South Rosevear, ne 11-54-15 w5m	50.0	21.1	[29]1-3	....	....	....	....	....	....	6.8	....
Waterton 1-2 and Straddle s½ 20-4-30 w4m, n½ 17-4-30 w4m, se¼ 24-4-1-w5m	315.0	199.0	[29]1-3-7	166.8	87.6	....	76.6	....	....	251.0	....
Star Oil & Gas Ltd.—Grassland, 6-13-68-18 w4m	2.0	1.0	4	....	....	....	....	....	....	....	....
Pouce Coupe, 11-34-79-12 w6m	10.0	6.0	3	....	....	....	....	4.0	....	....	....
Redwater, 8-25-57-23 w4m	6.2	3.0	2&4	....	....	....	....	....	....	....	....
Sunnybrook, Bell River Pool 15-22-48-2 w5m	5.0	2.5	3&4	....	....	....	....	....	0.5	....	....
Sylvan Lake, Basal Quartz, Glauc., 16-19-38-1 w5m	8.0	6.0	[13]1-3-4	....	....	....	....	5.9	....	....	....
Steen Resources Ltd.—Crossfield, 8-20-30-3 w5m	4.0	3.0	4	....	....	....	....	....	....	....	[11]4.2
Sulpetro Ltd.—Big Bend, 13-36-66-27 w4m	35.0	12.0	[5-11]1-3	....	....	....	....	....	....	....	....
Castor, 4-3-38-13 w4m	1.5	0.9	[11]1-6	....	....	....	....	....	3.8	....	....
Countess, 8-36-20-16 w4m	4.5	0.7	[11]1	....	....	....	....	....	....	....	....
Irish, 16-36-54-6 w4m	15.0	5.0	[11]1	....	....	....	....	....	....	....	....
Medicine Hat-Roseglen, 4-1-16-3 w4m	20.0	7.8	[11]1	....	....	....	....	....	....	....	....
Minnehik-Buck Lake, 10-5-46-6 w5m	102.0	45.5	[5]1	....	....	....	....	53.2	....	20.5	....
Wapiti, 4-8-69-8 w6m	125.0	78.5	[28]5-7 3-4	....	....	....	....	....	....	9.6	....
Wapiti Deep Cut, 4-8-69-8 w6m	320.0	124.0	3-4 [21]5-6-7	....	....	....	....	217.0	....	....	....
Suncor Inc.—Calling Lake South, 1-20-70-20 w4m	10.0	3.6	[11]1-4	....	....	....	....	....	....	....	....
Countess-Duchess, Newell Co., LSD 08-36-20-16 w4m	21.0	6.5	4-[27]5	....	....	....	....	0.3	....	....	....
Enchant, Taber Co., LSD 11-35-13-17 w4m	20.0	8.7	4-[27]5	....	....	....	....	0.4	....	....	....
Joffre, LSD 13-12-38-12 w4m	6.4	2.8	3	....	....	....	....	....	3.9	....	....
Killam, Flagstaff 29, LSD 12-23-42-11 w4m	20.0	1.8	4-[27]5	....	....	....	....	<0.1	....	....	....
Northwest Jenner, Imperial Dist., LSD 9-21-21-9 w4m	7.0	0.1	4-[27]5	....	....	....	....	....	....	....	....

	MMcfd			Production—1,000 gal/day (Average based on the past 12 months)							
Company, plant, location	Gas capacity	Gas throughput	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Sibbald, LSD 5-6-28-2 w4m	7.5	1.5	4-[27]5	....	....	....	....	<0.1	....	....	....
Suncor Rosevear, ne¼ 16-33-54-15 w5m	30.0	10.5	[6]5	....	....	....	....	....	....	4.2	....
Texaco-Canada Resources—Battle Lake, 20-42-25 w4m	5.5	0.6	3	....	....	....	....	0.2	....	....	....
*Bonnie Glen Cycle, 17-47-27 w4m	140.0	132.2	7	....	94.7	13.4	36.6	....	....	91.5	....
Bonnie Glen Gas No. 1, 17-47-27 w4m	50.0	24.8	[17]2	....	27.6	....	24.3	....	....	20.1	....
Bonnie Glen Gas No. 2, 17-47-27 w4m	50.0	44.4	3	167.2	143.9	26.2	64.7	....	....	59.0	....
Cynthia, 13 22-49-10 w5m	10.5	5.1	3	....	....	....	....	13.5	....	2.5	....
Gilby, 15-22-40-3 w5m	58.0	22.7	[17]1	....	12.8	....	10.8	....	....	10.9	....
Magee, 11-20-42-25 w4m	6.0	3.3	3	....	....	....	....	2.8	....	....	....
Open Creek 10-34-42-5 w5m	8.0	3.2	3	....	....	....	....	....	3.6	....	....
Wabasca, 16-36-80-25 w4m	6.0	2.0	4	....	....	....	....	....	....	....	....
Willesden Green, 17-42-6 w5m	12.2	8.2	3	....	....	....	....	13.2	....	5.2	....
Total Petroleum Canada Ltd.—Gilby, 10 12-41-3 w5m	8.0	3.2	[5]1-4-[28]5	....	....	....	....	....	....	....	[11]0.9
Hythe, 16-21-73-10 w6m	8.5	8.0	3-4	....	....	....	....	5.5	....	....	[11]3.9
Sutton 7 21-90-4 w6m	3.0	1.3	[11]1-4	....	....	....	....	....	....	....	....
Ulster Petroleums Ltd.—Huxley, 7-17-35-24 w4m	3.0	1.5	4	....	....	....	....	....	....	....	....
Rumsey, 8-12-34-21 w4m	6.0	4.5	3-4	....	....	....	....	....	4.0	....	....
Westcoast Transmission CL—Ferrier Cardium 2, LSD 1-20-39-7 w5m	23.0	14.0	3	....	....	....	....	....	14.0	....	....
Western Decalta Petroleum Ltd.—Brèton, LSD 9-36-47-4 w5m	3.5	1.5	3	....	....	....	....	2.2	....	....	....
Compeer, 6-36-33 2 w4m	5.0	1.8	[25]1	....	....	....	....	....	....	....	....
Diamond Valley, 10-12-19-2 w5m	20.0	19.7	7	44.0	28.6	....	19.1	....	....	13.8	....
Hotchkiss, North, LSD 3 35-94-2 w6m	16.0	7.7	[30]1	....	....	....	....	....	....	....	....
Rockyford, 10-24-26-23 w4m	5.0	1.3	3	....	0.2	....	0.3	....	....	0.3	....
Total	**20,832.4**	**11,326.3**		**4,426.9**	**1,767.8**	**220.9**	**824.3**	**1,119.0**	**4,208.3**	**2,705.4**	**104.0**

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†Fractionation. (Figures in parenthesis do not represent primary production, and are not added in state totals).

British Columbia

Amoco Canada Petroleum CL—Inga, 3-31-86-23 w6m	5.0	0.1	[11]1-4	....	....	....	....	....	....	....	....
Dome Petroleum Ltd.—Buick Creek North, 6-31 e-94 A-14	7.1	2.4	4	....	....	....	....	....	....	....	....
Dahl, a-89 H-94 H-7	7.0	1.0	4	....	....	....	....	....	....	....	....
Laprise, a-40 e-94 H-5	31.8	13.5	4	....	....	....	....	....	....	....	....
Velma, a-89 D-94 H-8	12.1	0.3	4	....	....	....	....	....	....	....	....
Esso Resources Canada Ltd.—Boundary Lake, 1-2-85-14 w6	17.5	8.1	2	....	13.7	....	9.0	....	....	3.9	....
Mobil Oil Canada Ltd.—Sierra, c-91-D 94-I-14	310.0	150.0	[21]5	....	....	....	....	....	....	....	....
Petro-Canada Explorations Inc.—Taylor, 3-25& 26-82-18 w6m Plan 7891, Peace River	397.0	313.5	[4]1[28]5	....	21.9	....	40.3	....	....	80.3	....
Westcoast Transmission CL—Boundary Lake, A-10-25 15 w6m	8.9	1.0	[19]1	....	....	....	....	....	....	....	....
Fort Nelson Lot 2683, Peace River	750.0	...	[5-19-12]1	....	....	....	....	....	....	....	....
Pine River, Lot 1156, Peace River	140.0	...	[29]1	....	....	....	....	....	....	....	....
Taylor, 2 36-82-18 w4m Peace River Dist., Plan 7891	550.0	NR	7	....	102.0	....	32.8	....	....	10.6	....
Total	**2,236.4**	**929.9**		....	**137.6**	....	**82.1**	....	....	**94.8**	....

Northwest Territories

Amoco Canada Petroleum Cl—Pointed Mountain, 95-85-n24	188.0	21.0	[11]1-4	....	....	....	....	....	....	....	....
Esso Resources Canada Ltd.—Norman Wells	8.0	1.1	5	....	....	....	....	....	....	....	....
Total	**196.0**	**22.1**		....	....	....	....	....	....	....	....

Saskatchewan

Dome Petroleum Ltd.—Steelman, w½-21-4-5 w2m	15.0	14.3	7	39.2	....	....	....	....	80.9	....	....
Esso Resources Canada Ltd.—Smiley, 8-9-31-25 w3m	3.0	0.4	3	....	....	....	....	....	0.5	....	....
ICG Resources Ltd.—Hatton, 4-15-14-27 w3m	9.0	8.0	3-4	....	....	....	....	....	....	....	....
Totnes, 15-33-027-18 w3m	2.5	1.5	4	....	....	....	....	....	....	....	....
Murphy Oil CL—North Dodsland, 8 13-32-21 w3m	3.0	1.6	3	....	....	....	....	....	....	....	[11]<0.1
Mobil Oil Canada Ltd.—Gull Lake, 9-5-14-19 w3m	1.9	1.0	4-[21]5	....	....	....	....	....	....	0.4	....
North Canadian Oils Ltd.—Hatton, 6-28-14-29 w3m	22.0	18.0	4	....	....	....	....	....	....	....	....
Hatton East, 4-21-14-28 w3m	18.0	15.0	4	....	....	....	....	....	....	....	....
Richmound, Hatton, 1-4-16-29 w3m	12.0	10.0	4	....	....	....	....	....	....	....	....
Saskatchewan Power Corp.—Coleville, nw 17-31-23 w3m	38.4	23.3	[17]2	....	....	....	....	....	....	....	[11]23.2
Hoosier, se 16-30-28 w3m	3.0	0.9	[27]5	....	....	....	....	....	....	....	[11]<0.1
Success, 17-16-17 w3m	50.0	3.1	[27]5	....	....	....	....	....	....	....	[11]<0.1
Star Oil & Gas Ltd.—Hatton 3, LSD 4 4-15-14-27 w3m	8.0	8.0	4	....	....	....	....	....	....	....	....
Hatton East, 16-19-13-26 w3m	9.6	9.6	4	....	....	....	....	....	....	....	....
Total	**195.4**	**114.7**		**39.2**	....	....	....	....	**81.4**	**0.4**	**23.2**

Company, plant, location	Gas capacity (MMcfd)	Gas throughput (MMcfd)	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
	—— MMcfd ——			—— Production—1,000 gal/day (Average based on the past 12 months) ——							
CHILE											
Empresa Nacional del Petroleo—*Cullen, Magallanes, XII Región	150.0	120.0	[17]2	....	60.5	....	40.7	....	....	27.4	....
Posesión-*Cabo Negro, Magallanes, XII Región	320.0	310.0	7	....	134.4	....	82.2	....	....	76.8	....
Total	**470.0**	**430.0**		....	**194.9**	....	**122.9**	....	....	**104.2**	....
CHINA, TAIWAN											
Chinese Petroleum Corp.—Chingtsaohu plant and field, Hsin Chu area	60.0	3.1	7	....	....	....	....	....	1.6	....	....
Chinshui plant, field, and area	36.0	15.7	[22]2	....	6.6	....	4.8	....	....	3.0	....
Chuhuangkeng plant, field, and area	75.0	35.3	[12]1	....	....	....	....	....	....	....	....
Tung Hsiao plant, Tieh-Che-Shan field, Tung Hsiao area	100.0	51.6	7	41.2	23.2	1.9	12.1	....	....	11.9	....
Total	**271.0**	**105.7**		**41.2**	**29.8**	**1.9**	**16.9**	....	**1.6**	**14.9**	....
COLOMBIA											
Empresa Colombiana de Petroleos—Barrancabermeja, Santander	100.0	65.0	7	90.3	12.0	....	....	....	....	....	....
Cicuco, Bolivar	40.0	12.0	3	....	....	....	....	4.3	....	2.5	....
GLP, El Centro, Santander	25.0	20.6	[14]2	....	16.0	....	18.0	....	....	24.0	....
International Petroleum Colombia Ltd.—Provincia, Santander	73.0	73.0	[32]2	....	30.0	....	40.0	....	....	30.0	....
Total	**238.0**	**170.6**		**90.3**	**58.0**	....	**58.0**	**4.3**	....	**56.5**	....
DENMARK											
Dansk Naturgas A/S—Nybro, Ribe Amt Jutland	**450.0**	**200.0**	[29 31]1-3-6	....	....	....	....	....	....	....	**[11]50.0**
DOMINICAN REPUBLIC											
Falconbridge Dominicana C × A—*Bonao field, Arzo-Nouel Province, LaVega, La Peguera	NR	NR	....	....	....	....	....	....	....	....	[6]88.2 [10]189.0
Total	....	....		....	....	....	....	....	....	....	**277.2**
DUBAI											
Arco Oil & Gas Co.—Marghan	**330.0**	**312.0**	6	....	....	....	....	....	....	....	**[11]820.0**
ECUADOR											
Ministerio de Recursos Naturales y Energ.—Cepe-Ancon, Santa Elena field, Guayas	NR	NR	1	....	....	....	....	1.9	8.6	....	....
Cepe-Cautivo plant, Santa Elena field, Guayas	NR	NR	1	....	....	....	....	0.5	0.5	....	....
Total	....	....		....	....	....	....	**2.4**	**9.1**	....	....
EGYPT											
Amoco Egypt Oil Co.—Abu Gharadig/Dahshour, Abu Gharadig field, Western Desert, Block 30	125.0	125.0	7	....	....	....	....	78.6	....	....	[11]189.3
Egyptian General Petroleum Corp.—Abu Gharadig field, 286 km west of Cairo, Western Desert	148.0	137.0	5-6-7	....	....	....	....	....	....	....	[11]301.1
Abu Madi plant and field, El Mansora, Dakahlia	254.0	250.0	6	....	....	....	....	....	....	....	[11]228.4
Abu Qir plant and field offshore, 60 km east of Alexandria	250.0	240.0	5-6-7	....	....	†64.8	....	....	....	....	[11]126.0
Dahshour, Abu Gharadig field, 65 km west of Cairo, Helwan	137.0	130.0	6-7	....	....	†107.9	....	....	....	....	
Ras-Shukeir	80.0	69.0	[21]5-6-7	....	....	....	....	109.2	....	....	[11]63.3
Sinai, Balayim, Abu Rudies	25.0	22.0	3	....	....	†39.0	....	....	....	....	[11]19.0
Total	**1,019.0**	**973.0**		....	....	**211.7**	....	**187.8**	....	....	**927.1**
FRANCE											
SNEA—Usine de Lacq	**570.0**	**563.0**	1	....	**139.0**	....	**132.0**	....	....	**270.0**	....
GERMANY											
Norddeutsche Erdgas Aufbereitungs GmbH—1—Scholen, Lower Saxony (near Sulingen)	38.0	21.0	1	(sulfur recovery only)							
2—Scholen, Lower Saxony (near Sulingen)	75.0	75.0	1	(sulfur recovery only)							
3—Scholen, Lower Saxony (near Sulingen)	205.0	175.0	1	(sulfur recovery only)							
Wintershall AG—Dueste 1, 2, 3, Staffhorst, Diepholz, Lower Saxony	NR	135.0	Sepasolv	(sulfur only)							
Ruetenbrock, Emsland, Lower Saxony	NR	45.0	Selexol	(sulfur only)							
Total	**542.9**	**451.0**									
GREECE											
North Aegean Petroleum Co.—*Sigma site, Prinos and South Kavala field	**10.5**	**9.5**	1&5	....	....	....	....	....	**85.0**	....	....

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†Isobutane, n-butane.

HUNGARY

Company, plant, location	MMcfd Gas capacity	Gas throughput	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
OKGT:											
Babócsa plant and field, Somogy	7.0	5.0	6	....	....	....	....	....	....	....	[11]2.2
Berekfürdő, Tatárülés-Kunmadaras, Szolnok	28.3	11.5	6	....	....	....	....	....	....	....	....
*Demjén plant and field, Heves	5.1	1.8	5	....	....	....	....	....	....	....	[11]0.2
Ebes plant and field, Hajdu-Bihar	8.5	3.6	6	....	....	....	....	....	....	....	[11]0.4
Endrőd plant and field, Bekes	70.0	65.0	6	....	....	....	....	....	60.4	....	....
Hajduszoboszló plant and field, Hajdu-Bihar	77.7	40.0	[1]2	....	2.8	....	2.3	16.9	....	14.0	[9]6.4
Kardoskút plant, Pusztaföldvár field, Békés	42.4	17.0	3	....	....	....	....	....	11.9	....	....
Kiskunhalas plant and field, Bács-Kiskun	7.1	3.8	6	....	....	....	....	....	....	....	[11]0.3
Szank plant and field, Bács-Kiskun	77.7	27.0	3	....	....	....	....	....	19.3	....	....
Szeged plant, Algyő field, Csongrád	435.0	268.0	[1]2-3&6	....	46.5	9.6	47.7	94.7	....	141.0	[1]27.2 [8]10.5 [9]335.0
Tázlár plant and field, Bács-Kiskun	28.3	11.8	6	....	....	....	....	....	....	....	[11]5.5
Üllés plant and field, Csongrád	160.0	113.0	6	....	....	....	....	....	210.5	....	....
Total	**947.1**	**567.5**		....	**49.3**	**9.6**	**50.0**	**111.6**	**302.1**	**155.0**	**387.7**

INDONESIA

Company, plant, location	MMcfd Gas capacity	Gas throughput	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Atlantic Richfield Indonesia Inc.—Ardjuna, nw Java Sea, 90 miles ne of Jakarta	180.0	104.0	7	....	373.2	....	....	....	....	219.7	[11]268.0
Petromer Trend Corp.—Arar, Kepala Burung, Irian Jaya	9.9	9.9	6	....	....	....	....	....	....	....	[11]5.8
Walio, Kepala Burung, Irian Jaya	2.4	2.4	6	....	....	....	....	....	....	....	[11]2.1
Petromina—Mundu, Jatibarang, West Java	35.0	23.5	3	....	....	....	....	33.0	16.2	....	....
Rantau, North Sumatra	28.0	17.5	1	....	....	....	....	18.6	....	....	....
Total Indonesie—Handil CPA, East Kalimantan	200.0	160.0	4	....	....	....	....	....	....	....	....
*Handil LEX, East Kalimantan, Psc Mahakam	250.0	160.0	3	....	....	....	....	....	260.0	....	....
*Senipah LEX, East Kalimantan, Psc Mahakam	12.0	9.8	1	....	....	....	....	....	....	....	[11]52.0
Senipah Tandem, East Kalimantan	22.0	13.3	4	....	....	....	....	....	....	....	....
Unocal—Santan LEX, Attaka, East Kalimantan	145.0	112.0	7	....	125.0	....	....	....	169.0	....	....
Total	**804.3**	**612.4**		....	**498.2**	....	....	**51.6**	**445.2**	**219.7**	**327.9**

ITALY

Company, plant, location	MMcfd Gas capacity	Gas throughput	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
AGIP SPA—Brugherio, Po Valley	300.0	7.0	1	....	....	....	....	....	....	....	....
Casalborsetti, Porto Garibaldi field, Bologna, Emilia-Romagna, Po Valley	794.0	416.0	1	....	....	....	....	....	....	0.1	....
Casirate d'Adda, Malossa field, Bergamo, Lombardia, Po Valley	106.0	23.0	2	....	....	....	....	24.1	159.1	....	....
Cortemaggiore, Piacenza, Po Valley	106.0	18.0	1	....	....	....	....	....	....	0.1	....
Crotone, Luna field, Catanzaro, Calabria	265.0	161.0	1	....	....	....	....	....	....	<0.1	....
Falconara, Barbara 'A' field, Ancona	176.0	54.0	1	....	....	....	....	....	....	....	....
Fano, Basil, Pesaro	88.0	26.0	1	....	....	....	....	....	....	....	....
*Gagliano, Emma, Sicily	141.0	11.0	5	....	....	....	....	....	....	5.9	....
Grottammare, Emilio-David field, Ascoli Piceno	114.0	39.0	1&2	....	....	....	....	....	....	4.4	....
Hera Lacinia, Crotone, Catanzaro	88.0	18.0	1	....	....	....	....	....	....	....	....
Minerbio, Bologna, Po Valley	1,589.0	100.0	1	....	....	....	....	....	....	<0.1	....
Pineto, Fratello-Squalo-Emma field, Roseto, Pescara	176.0	62.0	1	....	....	....	....	....	....	....	....
Ravenna Mare, Porto Corsini Est-Angela fields, Bologna, Emilia Romagna, Po Valley	354.0	206.0	1	....	....	....	....	....	....	0.1	....
Ripalta, Cremona, Po Valley	353.0	46.0	1	....	....	....	....	....	....	....	....
Rubicone, Cervia and Cesenatico fields, Bologna, Emilia-Romagna, Po Valley	265.0	144.0	1	....	....	....	....	....	....	0.3	....
Sergnano, Cremona, Po Valley	1,981.0	57.0	1	....	....	....	....	....	....	....	....
Settala, Po Valley	353.0	74.0	1	....	....	....	....	....	....	....	....
Total	**7,249.0**	**1,462.0**		....	....	....	....	**24.1**	**159.1**	**10.9**	....

KUWAIT

Company, plant, location	MMcfd Gas capacity	Gas throughput	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Kuwait Oil Co.—Mina Al-Ahmadi	†	†	†	....	(95.0)	....	(187.0)	....	....	(145.0)	....
Mina Al-Ahmadi	1,680.0	360.0	2	....	834.0	....	548.0	....	....	305.0	¶85.0
Total	**1,680.0**	**360.0**		....	**834.0**	....	**548.0**	....	....	**305.0**	**85.0**

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†100,000 b/d condensate capacity and 12,800 b/d throughput. †Fractionation. (Figures in parenthesis do not represent primary production, and are not included in totals). ¶Unsplit pentanes.

LIBYA

Company, plant, location	MMcfd Gas capacity	Gas throughput	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
Oasis Oil Co. of Libya Inc.—*Bahi, Concession 32	15.0	10.0	2&4	....	....	....	....	....	....	....	[11]160.0
*Dahra, Concession 32	140.0	20.0	2&4	....	....	....	....	....	....	....	[11]11.0
Defa, Concession 59 and 71	104.0	47.0	4	....	....	....	....	....	....	....	[11]210.0
Waha, Concession 59W	52.0	52.0	4	....	....	....	....	....	....	....	[11]170.0
Occidental of Libya, Inc.—103A, Sirte Basin Petroleum Zone II	670.0	450.0	3	....	....	....	....	....	666.0	....	....
103D, Sirte Basin, Petroleum Zone II	420.0	255.0	3	....	....	....	....	....	375.0	....	....
Socialist People's Libyan Arab Jamahirya, Marsa Brega	450.0	393.0	NR	....	....	....	....	37.8	4,536.0	....	....
Total	**1,851.0**	**1,227.0**		....	....	....	....	**37.8**	**5,577.0**	....	**551.0**

	—— MMcfd ——			—— Production—1,000 gal/day (Average based on the past 12 months) ——							
Company, plant, location	Gas capacity	Gas throughput	Process/ condition method	Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
MALAYSIA											
Petronas—Dew Point Control Unit, Kerteh, Terengganu	250.0	90.0	6-7	....	20.0	20.0	....	....	....	60.0	....
LPG Unit, Kerth Kemaman, Terengganu	32.0	30.0	—[17-24]2	....	120.0	100.0	....	5[illegible]	....	90.0	....
Total	**282.0**	**120.0**		....	**140.0**	**120.0**	....	**55.0**	....	**150.0**	....
MEXICO											
Petroleos Mexicanos—Cactus, Chiapas (6 plants)	1,600.0	1,317.0	6-7	†1,569.7	‡3,494.0	....	....	....	....	....	....
Ciudad Pemex A, Tabasco	550.0	450.0	[17]2	†247.0	‡551.0	....	....	....	....	....	....
Cuidad Pemex C, Tabasco	200.0	165.0	7	†120.0	‡268.0	....	....	....	....	....	....
La Venta A, Tabasco	200.0	195.0	[17]2	†184.0	‡410.0	....	....	....	....	....	....
La Venta C, Tabasco	215.0	182.0	7	†308.0	‡687.0	....	....	....	....	....	....
Matapionche, Veracruz	30.0	38.0	3	....	....	....	....	....	....	....	[11]14.0
Nuevo Pemex, Tabasco	500.0	191.0	7	288.0	....	....	....	385.4	....	206.1	....
Pajaritos, Coatzacoalcos, Veracruz	192.0	136.0	7	209.5	....	....	....	....	....	....	....
Poza Rica, Veracruz	297.0	275.0	7	457.3	154.4	3.5	81.0	....	....	2.3	....
Reynosa, Tamaulipas	550.0	300.0	[17]2	104.2	92.1	....	72.0	....	....	108.1	....
Total	**4,334.0**	**3,249.0**		**3,487.7**	**5,657.2**	**3.5**	**153.0**	**385.4**	....	**316.5**	**14.0**
†Estimate. ‡Estimate, C_3+.											
NETHERLANDS											
Amoco Netherlands Petroleum Co.—Alkmaar, (Koedijk), Bergen, North Holland	**440.0**	**81.5**	[28]5	....	....	....	....	....	....	....	**[11]5.5**
NEW ZEALAND											
Natural Gas Corp. of New Zealand—*Kapuni, Taranaki, Lot 1. Dp 5227, Sec. 11, B-XVI, Kaupokouni SD area 11.2.27	96.0	59.0	2-[11]5	....	30.0	....	....	....	....	10.0	....
*Kapuni	152.0	68.0	3-[11]5	....	....	....	....	....	....	....	....
Total	**248.0**	**127.0**		....	**30.0**	....	....	....	....	**10.0**	....
NORWAY											
Amoco Norway Oil Co.—Valhall A, 56° 16' 41.395" North, 3° 23' 43.193" East	350.0	37.0	7	....	....	....	....	....	201.6	....	....
Statoil—Statpipe, Tysvaer, Rogaland	600.0	364.0	6-7	....	639.3	91.2	234.3	....	....	178.7	....
Total	**950.0**	**401.0**		....	**639.3**	**91.2**	**234.3**	....	**201.6**	**178.7**	....
PAKISTAN											
Oil and Gas Development Corp.—Sari-Hundi plant and field, Dadu district, Sind province	25.0	8.9	1	....	....	....	....	....	....	....	[11]<0.1
Pakistan Oilfields Ltd.—Meyel field, Attock district, Punjab province	40.0	20.0	1	....	....	....	....	....	....	....	[11]4.7
Meyel field, Attock district, Punjab province	75.0	22.0	7	....	....	....	....	47.0	....	7.6	....
Sui Gas Transmission CL—*Sibbi district, Baluchistan	670.0	630.0	1&5	....	....	....	....	....	....	....	[11]3.1
Sui Northern Gas Pipelines Ltd.—*Sibbi district Baluchistan	140.0	130.0	1	....	....	....	....	....	....	....	....
Total	**850.0**	**810.9**		....	....	....	....	**47.0**	....	**7.6**	**7.8**
PERU											
Petroleos del Peru—Pariñas-Pozo, Piura, Talara	70.0	37.0	[17-24]2&4	....	....	....	....	....	....	....	....
Verdun, Pariñas, Piura, Talara	....	....	...	....	2.1	....	0.8	7.2	25.4	....	3.2
Total	**70.0**	**37.0**		....	**2.1**	....	**0.8**	**7.2**	**25.4**	....	**3.2**
QATAR											
Qatar General Petroleum Corp.—Umm Said No. 1, Dukhan field, onshore	330.0	160.0	[11]1-3-4 [21]5	....	278.4	....	152.2	....	....	81.2	....
Umm Said No. 2, offshore	230.0	100.0	[11]1-3-4 [21]5	....	218.3	....	161.6	....	....	136.4	....
Total	**560.0**	**260.0**		....	**496.7**	....	**313.8**	....	....	**217.6**	....
SAUDI ARABIA											
Arabian American Oil Co.†—Abqaiq	560.0	NR	3-4	....	....	....	....	....	....	....	....
Berri	600.0	NR	[7]1-3-4 [21]5	....	....	....	....	....	....	....	....
Ras Tanura	120.0	NR	[7]1-3-4 [21]5	....	....	....	....	....	....	....	....
Shedgum	1,500.0	NR	[7]1-3-4 [21]5	....	....	....	....	....	....	....	....
Uthmaniyah	1,500.0	NR	[7]1-3-4 [21]5	....	....	....	....	....	1,176.0	....	....
Total	**4,300.0**	....		....	....	....	....	....	**1,176.0**	....	....

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†Design capacity. Fractionation plants located at Ju'Aymah, Ras Tanura and Yanbu.

Plant operators Tim Ritter and Jesse James work at computers in Conoco's new San Juan natural gas processing plant.

Company, plant, location	MMcfd Gas capacity	MMcfd Gas through-put	Process/ condition method	Production—1,000 gal/day (Average based on the past 12 months) Ethane	Prop.	Isobut.	Normal or unsplit butane	LP-gas mix	Raw NGL mix	Debut. nat. gaso.	Other
SHARJAH											
Amoco Sharjah Oil Co.—Sajaa field	580.0	550.0	...	....	....	....	....	....	....	....	^{11}2,151.6
Shalco LPG, Sajaa field	440.0	420.0	7	....	88.1	....	96.8	....	....	....	^{11}99.7
Total	**1,020.0**	**970.0**		....	**88.1**	....	**96.8**	....	....	....	**2,251.3**
UNITED KINGDOM											
Amoco U.K.—Bacton, Gordon-Forbes-Esmond, 43/8 13, 15	370.0	350.0	3	....	....	....	....	....	....	....	^{11}30.0
Bacton, Leman 49/26 27, 28&53/1-2	1,200.0	554.0	3	....	....	....	....	....	....	....	^{11}15.2
Bacton, Indefatigable 49/18 19-23&24, Norfolk Co.	600.0	312.0	3	....	....	....	....	....	....	....	^{11}22.6
Northwest Hutton, 211/27	43.2	5.0	7	....	....	....	....	....	116.8	....	....
BP Petroleum Development UK Ltd.—Easington and West Sole, Block 48/6, Southern North Sea	300.0	168.0	1-2 4-5	....	....	....	....	....	....	....	^{12}11.8
Kinneil, Forties Field	70.0	48.0	4	....	332.0	....	291.0	....	....	176.0	....
Total Oil Marine Ltd.—Saint Fergus, Frigg field, Grampian province	65.0	46.0	3	....	....	....	....	....	....	1,572.5	....
Total	**2,848.2**	**1,403.0**		....	**332.0**	....	**291.0**	....	**116.8**	**1,748.5**	**79.6**
VENEZUELA											
Corpoven											
Bajo Grande fractionation plant, Zulia	....	....	†	....	(93.1)	(33.1)	(39.9)	....	....	(90.0)	....
El Tablazo, Zulia	165.0	137.0	7	....	158.8	78.7	....	....	....	53.4	....
*Lama Liquido, Zulia	150.0	96.0	3	....	80.0	....	62.7	....	....	78.5	....
Lamar Liquido, Zulia	162.0	48.0	3	....	13.3	10.5	....	....	....	11.5	....
Jose, Oriente, Anzoategui	800.0	NR	7	....	105.4	40.2	48.9	18.4	....	37.4	....
San Joaquin, Oriente, Anzoategui	800.0	NR	7	....	....	....	....	....	104.4	....	....
Lagoven											
Bachaquero 1, Zulia	440.0	390.0	4	....	....	....	....	....	17.2	....	....
Tia Juana 1, Zulia	230.0	140.0	1	....	....	....	....	....	1.4	....	....
Tia Juana 2, Zulia	450.0	400.0	3	....	....	....	....	....	668.1	....	....
Tia Juana 3, Zulia	455.0	410.0	3	....	....	....	....	....	431.3	....	....
Ule fractionation plant, Punta Gorda Zulia	....	....	†	....	(448.4)	(135.1)	(264.0)	....	....	(499.5)	....
Maraven											
La Paz, Zulia	150.0	84.0	1	....	28.1	7.8	21.1	....	....	22.6	....
Mara, Zulia	55.0	38.0	1	....	8.9	....	....	....	....	9.4	....
Meneven											
Guara Oeste, Anzoategui	42.0	24.0	1	....	....	....	....	19.6	....	15.3	....
Oficina, Anzoategui	9.0	1.0	1	....	....	....	....	0.3	....	2.7	....
Santa Rosa, Anzoategui	150.0	70.0	2	....	....	....	....	222.6	....	8.4	....
RLM, Anaco, Anzoategui	400.0	230.0	3	....	....	....	....	179.9	....	....	....
Total	**4,251.0**	**3,348.0**		....	**394.5**	**137.2**	**132.7**	**440.8**	**1,222.4**	**239.2**	....

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†Parenthetical figures do not represent primary production, and are not added to totals. Bajo Grande plant fractionates LP-gas mix from Corpoven's Lama and El Tablazo plants and Maraven's Lamar and La Paz plants. Ule plant fractionates all raw NGL mix from Lagoven plants.

World sulfur derived from oil, gas production

AILLEEN CANTRELL
Director of Editorial Surveys

As of Jan. 1, 1987

			— Metric tons/day —	
Company and location	Source	Type of process	Design capacity	Production
ABU DHABI				
Abu Dhabi National Oil Co.				
Thamama C Bab	nat. gas	Claus	800.0	285.0
Ruwais	ref. gas	Claus	93.0	30.0
ARGENTINA				
Duperial				
San Lorenzo	acid gas	....	44.2	0
Electroclor SAIC				
Capitan Bermudez, Santa Fe	carb. disulf	....	10.6	9.7
AUSTRALIA				
Caltex Refining CPL				
Kurnell, NSW	ref. gas	Claus	70.0	12.2
Petroleum Refineries Australia PL				
Adelaide	ref. gas	....	26.0	4.0
Altona	ref. gas	....	25.0	4.0
Shell Refining (Australia)				
Clyde, NSW	ref. gas	Claus-DEA	75.0	9.0
Geelong, Victoria	ref. gas	Claus-DEA	80.0	20.0
AUSTRIA				
OeMV AG				
Aderklaa	nat. gas	Claus	32.0	18.0
Schwechat	ref. gas	Claus	215.0	97.0
Schwechat	flue gas	Claus	34.0	....
BAHRAIN				
Bahrain Petroleum Co. BSC (Closed)				
Sitra	ref. gas	Mod. Claus	150.0	128.0
BELGIUM				
Belgian Refining Corp.				
Antwerp	ref. gas	....	108.5	....
Esso Belgium NV				
Antwerp	ref. gas	2 Claus 1 IFP	350.0	230.0
SIBP				
Antwerp	ref. gas	Claus	225.0	60.0
BRAZIL				
Petrobras				
Recap—Capuava, SP	crude oil	....	25.0	3.0
Refap—Canoas, RS	crude oil	....	20.0	17.0
Regap—Betim, MG	crude oil	....	60.0	31.0
Repar—Araucária, PR	crude oil	....	65.0	58.0
Replan—Paulínia, SP	crude oil	....	60.0	36.0
Revap—São Jose Campos, SP	crude oil	....	170.0	45.0
Petroflex SA				
Duque de Caxias, RJ	ref. gas acid gas	Claus	40.0	30.0
Ultrafertil SA				
Araucária, PR	resid asphalt	Claus Claus Pool 1500	57.8	35.0
Cubatão, SP	ref. gas acid gas	Claus	45.0	18.0
CANADA				
Amoco Canada Petroleum CL				
Bigstone, Al.	nat. gas	2 bed Claus	382.0	120.0
East Crossfield, Al.	nat. gas	3 bed Claus and CBA	1,673.7	1,040.0
West Whitecourt, Al.	nat. gas	2 bed Claus	1,225.0	1,000.0
Canadian Occidental Petroleum Ltd.				
Paddle River, Al.	nat. gas	....	25.4	8.0
Canterra Energy Ltd.				
Nordegg River, Al.	nat. gas	Claus	40.0	24.0
Okotoks, Al.	nat. gas	Claus	440.0	400.0
Rainbow Lake, Al.	oil and gas	Claus	150.0	60.0
Ram River, Al.	nat. gas	Claus	4,600.0	2,950.0
Chevron Canada Ltd.				
Burnaby, BC	ref. gas	....	10.0	1.0
Chevron Canada Resources Ltd.				
Kaybob, South Al.	nat. gas	....	3,200.0	1,094.0
Dome Petroleum Ltd.				
Brazeau, Al.	nat. gas	Mod. Claus	118.2	40.0
Caroline, Al.	nat. gas	Mod. Claus	18.0	6.0
Edson, Al.	nat. gas	Mod. Claus	297.0	110.0
Kaybob I-II, Al.	nat. gas	Mod. Claus	1,097.0	450.0
Lone Pine, Al.	nat. gas	Mod. Claus	283.0	106.0
Sturgeon Lake, Al.	nat. gas	Mod. Claus	105.0	76.0
West Pembina, Al.	nat. gas	Mod. Claus	300.0	300.0
Zama, Al.	nat. gas	Mod. Claus	80.0	21.0
Esso Resources Canada Ltd.				
Joffre	solution gas	....	28.9	6.0
Quirk Creek	nat. gas	....	294.0	119.0
Redwater	solution gas	....	25.0	12.4
Gulf Canada Corp.				
Hanlan-Robb, Al.	nat. gas	Mod. Claus Sulfreen-TG	1,100.0	520.0
Nevis, Al.	nat. gas	Mod. Claus Sulfreen-TG	163.0	110.0
Rimbey, Al.	nat. gas	Mod. Claus	333.0	100.0
Strachan, Al.	nat. gas	4 bed Amoco Cold bed adsorption	1,000.0	450.0
Mobil Oil Canada Ltd.				
Harmattan, Al.	nat. gas	Claus 3 stage	430.0	150.0
Lone Pine Creek So., Al.	nat. gas	Claus 3 stage	119.0	60.0
Teepee Creek, Al.	nat. gas	Claus 2 stage	30.0	30.0
Wimborne, Al.	nat. gas	Claus 2 stage	340.0	125.0
Petro-Canada Inc.				
Brazeau, Al.	nat. gas	....	78.4	78.4
Gold Creek, Al.	nat. gas	....	100.0	15.0
Wildcat Hills, Al.	nat. gas	....	170.0	80.0
Petrogas Processing Ltd.				
Calgary, Al.	nat. gas	....	1,670.0	....
Saratoga Processing CL				
Coleman, Al.	sour gas	Mod. Claus	400.0	278.0
Shell Canada Ltd.				
Sarnia, Ont.	ref. gas	Claus	35.0	15.0
Scotford, Al.	ref. gas	Claus	10.0	3.0
Vancouver, BC	ref. gas	Claus-Scot	15.0	5.0
Shell Canada Resources Ltd.				
Burnt Timber, Al.	nat.gas	Claus	490.0	396.0
Innisfail, Al.	nat. gas	Claus	160.0	15.0
Jumping Pound, Al.	nat. gas	Claus	570.0	427.0
Progress, Al.	nat. gas	Claus-MCRC	13.0	....
Rosevear, Al.	nat. gas	Claus	160.0	49.0
Simonette, Al.	nat. gas	Claus	260.0	75.0
Waterton, Al.	nat. gas	Claus-Scot	2,900.0	2,452.0
Sulconam Inc.				
Montreal East, Que.	ref. gas	Claus	300.0	125.0
Sulpetro				
Minnehik-Buck Lake, Al.	nat. gas	Claus 2 stage	35.0	22.0
Suncor Inc.				
Ft. McMurray, Al.	oil sands	....	730.0	208.0
Rosevear, Al.	nat. gas	....	....	40.0
Sarnia, Ont.	ref. gas	....	....	14.0
Syncrude Canada Ltd.				
Mildred Lake, Al.	oil sands	Claus 3 stage	970.0	830.0
Texaco Canada Resources Ltd.				
Bonnie Glen, Al.	nat. gas	Mod. Claus	15.0	8.3
Westcoast Transmission CL				
Chetwynd, BC	sour gas	MCRC	1,034.0	560.0
Fort Nelson, BC	sour gas	Mod. Claus Sulfreen	650.0	390.0
Taylor, BC	sour gas	Mod. Claus	460.0	260.0
Western Decalta Petroleum Ltd.				
Hartell, Al.	nat. gas	Claus 3 stage	10.7	10.7
CHINA, TAIWAN				
Chinese Petroleum Corp.				
Kaohsiung	ref. gas	Parsons	135.0	....
Tao-Yuan	ref. gas	Amoco	520.0	152.5
COLOMBIA				
Empresa Colombiana de Petroleos				
Barrancabermeja	ref. gas	Claus	80.0	42.0
DENMARK				
A/S Dansk Shell				
Fredericia	ref. gas	Claus	25.0	8.0
Kuwait Petroleum Refining Denmark A/S				
Gulfhavn	ref. gas	Claus	50.0	26.0
EGYPT				
Ameria Petroleum Refining Co.				
Alexandria	ref. gas	....	....	3.0
General Petroleum Co.				
Eastern Desert	nat. gas	....	....	8.0
Suez Oil Processing Co.				
El-Suez	ref. gas	....	81.5	9.0

Company and location	Source	Type of process	— Metric tons/day — Design capacity	Production
FINLAND				
Neste Oy				
Naantali	ref. gas	. . . .	55.0	27.0
Porvoo	ref. gas	. . . .	215.0	110.0
FRANCE				
Cie. de Raff. et de Distillation Total France				
Gonfreville l'Orcher	refinery	Claus	190.0	130.0
La Mede	refinery	Claus	190.0	90.0
Mardyck	refinery	Claus	127.0	80.0
Cie. Rhenane de Raffinage				
Reichstett	refinery	Claus	70.0	22.0
Elf France				
Donges	refinery	Claus	210.0	66.4
Feyzin	refinery	Claus	118.0	40.0
Grandpuits	refinery	Claus	125.0	27.0
Esso SA Francaise				
Fos-sur-Mer	refinery	. . . .	21.9	18.5
Port Jerome	refinery	. . . .	21.9	9.1
Shell Francaise				
Berre	refinery	Claus	210.0	140.0
Petit-Couronne	refinery	Claus	210.0	140.0
Ste. Francaise des Petroles BP				
Lavera	ref. gas	. . . .	122.0	. . . .
Ste. Francaise Hoechst				
Port Jerome	ref. gas	Claus	240.0	. . . .
Ste. Nationale Elf Aquitaine				
Lacq	sour gas	Claus Sulfreen	. . . .	2,591.8
GERMANY				
Deutsche BP				
Vohburg	gas oil	IFP TG and Claus	60.0	17.0
Deutsche Marathon				
Burghausen	ref. gas	Claus	33.0	15.0
Deutsche Shell				
Godorf	refinery	Claus-Scot	140.0	60.0
Harburg	refinery	Claus-Scot	78.5	30.0
Deutsche Texaco				
Heide	ref. gas	2 Claus Maxisulf	57.0	21.0
Erdgasaufbereitungsanlage				
Grossenkneten	nat. gas	. . . .	2,100.0	1,527.0
Erdölraffinerie Ingolstadt AG				
Ingolstadt	gas oil	IFP TG and Claus	32.0	22.0
Erdol-Raffinerie Neustadt GmbH & Co. oHG				
Neustadt-Donau	refinery	Claus Sulfreen	89.0	23.0
Esso				
Hamburg	rinery	Claus Sulfreen	80.0	20.0
Ingolstadt	refinery	Claus Sulfreen	50.0	31.0
Karlsruhe	refinery	Claus Sulfreen	100.0	55.0
Mobil Oil AG				
Woerth	ref. gas	. . . .	60.0	12.0
Norddeutsche Erdgas-Aufbereitungs				
Sulingen	nat. gas	. . . .	1,050.0	750.0
OMW GmbH				
Karlsruhe	ref. gas	Claus Sulfreen	175.0	. . . .
Ruhr Oel GMBH				
Gelsenkirchen	refinery	. . . .	415.0	. . . .
Union Rheinische Braunkohlen Kraftstoff AG,				
Wesseling	ref. gas	Claus	375.0	50.0
Wintershall AG				
Dueste	nat. gas	. . . .	320.0	200.0
Lingen	ref. gas	. . . .	72.0	60.0
Mannheim	ref. gas	. . . .	52.0	. . . .
GREECE				
Hellenic Aspropyrgos Refinery SA				
Aspropyrgos, Attiki	ref. gas	Claus	40.0	35.0
Motor Oil Hellas				
Corinth	refinery	. . . .	90.0	16.0
HUNGARY				
Danube Petroleum Refining Co.				
Szazhalombatta	refinery	Claus	77.0	65.0
Tisza Petroleum Refining Co.				
Leninvaros	refinery	Claus	24.0	13.0
ISRAEL				
Oil Refineries Ltd.				
Ashdod	ref. gas	Claus	30.0	30.0
Haifa	ref. gas	Claus	50.0	50.0
ITALY				
API-Raffineria di Ancona SpA				
Falconara	ref. gas	Claus	41.0	35.0
Esso Italiana				
Augusta	ref. gas	. . . .	104.0	52.0
Trecate	refinery	. . . .	40.0	30.0
Industria Italiana Petroli				
Rho	ref. gas	Claus	30.0	14.3
Taranto	ref. gas	Claus	121.0	43.9
Irom				
Porto Marghera	refinery	Claus	20.0	13.7
Isab				
Melilli	refinery	. . . .	310.0	. . . .
Mediterranea				
Milazzo	ref. gas	Claus	100.0	. . . .
Mobil Oil Italiana				
Naples	ref. gas	. . . .	70.0	8.0
Raffineria del Po				
Sannazzarro	ref. gas	Claus	80.0	38.7
Saras				
Sarroch	ref. gas	Parsons	35.0	(spare)
Sarroch	ref. gas	Parsons	90.0	65.0
Stanic				
Livorno	ref. gas	Claus	21.0	16.6
Tamoil Italia				
Cremona	ref. gas	Claus	12.0	6.0
Cremona	ref. gas	Claus	30.0	12.0
IVORY COAST				
Soc. Ivoirienne de Raffinage				
Abidjan-Vridi	ref. gas	. . . .	40.0	. . . .
JAPAN				
Asia Kyoseki Co.				
Sakaide	ref. gas	Parsons	80.0	40.0
	ref. gas	Uhde	185.0	90.0
Asia Oil CL				
Yokohama	ref. gas	Parsons	200.0	0
Cosmo Oil CL				
Chiba	ref. gas	Parsons	600.0	250.0
Sakai	ref. gas	70 t/d Pan American Parsons 70 t/d	140.0	50.0
Yokkaichi	ref. gas	Parsons	200.0	40.0
Fuji Oil CL				
Sodegaura, Chiba	ref. gas	Comprimo	150.0	130.0
Sodegaura, Chiba	ref. gas	Parsons	90.0	. . . .
General Sekiyu KK				
Sakai	ref. gas	Claus Flexsorb SE amine	386.0	148.0
Idemitsu Kosan CL				
Aichi	ref. gas	Uhde	400.0	196.0
Chiba	ref. gas	Uhde-Parsons	560.0	265.0
Hokkaido	ref. gas	Comprimo	50.0	26.0
Hyogo	ref. gas	Parsons	230.0	105.0
Tokuyama	ref. gas	Girdler-Uhde	235.0	69.0
Kashima Oil CL				
Kashima	ref. gas	Parsons	420.0	100.0
Koa Oil CL				
Marifu	ref. gas	Parsons	45.0	. . . .
Marifu	ref. gas	Comprimo	35.0	15.0
Osaka	ref. gas	Parsons	60.0	25.0
Kyokuto Petroleum Industries Ltd.				
Chiba	ref. gas	. . . .	215.0	48.0
Nichimo Sekiyu KK				
Kawasaki	refinery	. . . .	22.6	. . . .
Nippon Mining CL				
Mizushima	ref. gas	Uhde-Claus	200.0	90.0
Mizushima	ref. gas	Comprimo Claus	200.0	90.0
Nagoya, Aichi	ref. gas	Uhde-Claus	150.0	60.0
Nippon Petroleum Refining CL				
Muroran	ref. gas	Parsons	420.0	107.0
Negishi	ref. gas	Parsons	320.0	135.0
Nippon Steel Chemical CL				
Oita	BTX refin.	. . . .	3.0	3.0
Tobata	coke oven gas	. . . .	2.1	2.1
Okinawa Sekiyu Seisei CL				
Okinawa City	refinery	. . . .	300.0	180.0
Seibu Oil Co.				
Yamaguchi	refinery	. . . .	320.0	. . . .
Showa Oil Co.				
Kawasaki	fuel oil	. . . .	80.0	. . . .
Showa Yokkaichi Seikyu KK				
Yokkaichi	ref. gas	. . . .	280.0	. . . .
Toa Nenryo Kogyo KK				
Kawasaki	ref. gas	Claus	295.0	87.0
Wakayama	ref. gas	Claus	169.0	71.0
Toa Oil Co.				
Kawasaki	ref. gas	Claus	330.0	125.3
KOREA				
Ssangyong Refining CL				
Onsan	ref. gas	Claus	43.8	28.0

Company and location	Source	Type of process	— Metric tons/day — Design capacity	Production
KUWAIT				
Kuwait National Petroleum Co.				
Mina Abdullah	ref. gas	Claus	165.0	150.0
Mina Al-Ahmadi	ref. gas	Claus	*1,334.0	600.0
Shuaiba	ref. gas	Claus	†1,200.0	300.0
*Two identical units—each 267 t/d. and two identical units–each 400 t/d.				
†Two identical units—each 600 t/d.				
MEXICO				
Petroleos Mexicanos				
Azcapotzalco, DF	ref. gas	Claus	22.6	17.8
Cadereyta, Ver.	ref. gas	Claus	71.2	11.4
Cactus, Chis	nat. gas	Claus	1,302.0	501.7
Cuidad Madero, Tamps	ref. gas	Claus	54.8	27.1
Ciudad Pemex, Tab.	nat. gas	Claus	650.9	285.3
Matapionche, Ver.	nat. gas	Claus	27.1	14.6
Minatitlan, Ver.	ref. gas	Claus	71.2	0.9
Nuevo Pemex, Tab.	nat. gas	Claus	650.9	324.9
Poza Rica, Ver.	nat. gas	Claus	126.6	55.0
Salamanca, Gto	ref. gas	Claus	153.4	4.1
Salina Cruz, Oax.	ref. gas	Claus	71.2	7.6
Tula, Hgo	ref. gas	Claus	153.7	16.6
NETHERLANDS				
BP Raffinaderij Nederland NV				
Rotterdam	ref. gas	Claus	172.0	73.0
Esso Nederland				
Rotterdam	ref. gas	. . . .	564.0	285.0
Kuwait Petroleum Europoort BV				
Europoort	ref. gas	Claus	45.9	34.9
Shell Nederland Raffinaderij				
Rotterdam	refinery	Claus	540.0	175.0
Texaco				
Pernis	ref. gas	Claus	90.0	23.5
NETHERLANDS ANTILLES				
Refineria Isla Curazao SA				
Emmastad	refinery	. . . .	225.0	69.0
NORWAY				
Norske Shell a.s.				
Sola	refinery	Claus	20.0	3.0
Rafinor a.s.				
Mongstad	ref. gas	. . . .	13.0	11.0
PORTUGAL				
Petrogal				
Lisbon	cat cracking gas	Claus	30.0	21.0
Sines	ref. gas	Claus	100.0	10.0
PUERTO RICO				
Yabucoa Sun Oil Co.				
Yabucoa	acid gas	Claus	34.0	12.0
QATAR				
Qatar Petrochemical Co.				
Umm Said	acid gas	Claus	140.0	133.0
SAUDI ARABIA				
Petromin				
Berri	associated gas	Claus	1,200.0	640.0
Ras Tanura	refinery	. . . .	270.0	71.0
Shedgum	associated gas	Claus	1,700.0	1,690.0
Uthmaniyah	associated gas	Claus	1,100.0	1,200.0
Petromin Mobil Refining Co.				
Yanbu	refinery	. . . .	300.0	200.0
Petromin Shell Refining Co.				
Juball	refinery	. . . .	300.0	161.0
SINGAPORE				
Esso Singapore PvL				
Jurong	ref. gas	Claus	126.0	12.0
Mobil Oil Singapore PL				
Jurong	ref. gas	. . . .	110.0	25.0
Shell Eastern Petroleum				
Pulau Bukom	refinery	Claus	300.0	100.0
Singapore Petroleum CPvL*	ref. gas	Claus	257.0	93.0
Singapore Refining Co.	refinery		*217.0	65.0
Jurong	. . . .		. . . .	. . . .
*36.7% share in design capacity.				
SOUTH AFRICA				
Mobil Refining Co. of Southern Africa PL				
Durban	ref. gas	. . . .	70.0	25.0
National Petroleum Refiners of South Africa PL				
Sasolburg	ref. gas	Claus	90.0	. . . .
Shell & BP South Africa Petroleum Refineries PL				
Durban	ref. gas	. . . .	106.0	. . . .
SPAIN				
Empetrol				
Cartagena	refinery	Claus	27.0	. . . .
La Coruña	refinery	Claus	49.0	. . . .
Puertollano	refinery	Claus	80.0	19.0
Tarragona	refinery	Claus	144.0	65.0
Petronor				
Muskiz, Vizcaya	ref. gas	Claus	242.0	88.0
Union Explosivos Rio Tinto SA				
La Rábida, Huelva	ref. gas	Claus	12.0	8.0
SWEDEN				
BP Raffinaderi Goteburg AB				
Gothenburg	ref. gas	. . . .	6.0	. . . .
Shell Raffinaderi BV				
Gothenburg	refinery	Claus	27.0	8.0
Skandinaviska Raffinaderi AB				
Lysekil	refinery fuel	Claus	225.0	125.0
SWITZERLAND				
Raffinerie de Cressier SA				
Cressier	refinery	Claus	20.0	8.0
TRINIDAD				
Trinidad and Tobago Oil CL				
Pointe-a-Pierre	ref. gas	Claus	250.0	. . . .
TURKEY				
Tupras				
Izmir	ref. gas	Claus	14.2	6.0
Izmit	ref. gas	Claus	45.0	6.0
Kirikkale	ref. gas	Claus	23.2	3.0
UNITED KINGDOM				
Amoco U.K.				
Milford Haven	refinery	Claus	76.0	. . . .
BP Oil				
Grangemouth	ref. gas	. . . .	100.0	. . . .
Llandarcy	ref. gas	. . . .	45.0	. . . .
Conoco Ltd.				
South Humberside	ref. gas	. . . .	50.0	35.0
Esso Petroleum CL				
Fawley	hydrodesulf/ cat plant	. . . .	270.0	25.0
Gulf Oil Refining Ltd.				
Milford Haven	ref. gas	. . . .	10.0	4.1
Lindsey Oil & Refining Ltd.				
Killingholm, South Humberside	ref. gas	Claus	120.0	60.0
Mobil Oil CL				
Coryton	ref. gas	. . . .	200.0	12.0
Pembroke Cracking Co.				
Pembroke	ref. gas	Claus	160.0	19.5
Shell U.K. Oil				
Shell Haven	ref. gas	Claus	130.0	30.0
Stanlow	ref. gas	Claus	250.0	50.0
UNITED STATES				
Amoco Oil Co.				
Mandan, ND	ref. gas	Claus	15.0	. . . .
Texas City, Tex.	ref. gas	Claus	1,400.0	. . . .
Whiting, Ind.	ref. gas	Claus	400.0	. . . .
Yorktown, Va.	ref. gas	Claus	56.0	. . . .
Amoco Production Co.				
Andrews County, Tex.	nat. gas	2 bed Claus and CBA	21.8	18.0
Andrews County, Tex.	nat. gas	2 bed Claus	5.5	4.0
Ector County, Tex.	nat. gas	2 bed Claus	30.0	24.0
Eddy County, NM	nat. gas	2 bed Claus	36.0	28.0
Fremont County, Wyo.	nat. gas	2 bed Claus	61.0	20.0
Hockley County, Tex.	nat. gas	2 bed Claus	43.0	36.1
Park County, Wyo.	nat. gas	2 bed Claus	76.0	56.0
Uinta County, Wyo.	nat. gas	2 bed Claus and CBA	1,205.0	1,080.0
Van Zandt, Tex.	nat. gas	3 bed Claus	313.0	218.0
Wood County, Tex.	nat. gas	2 bed Claus	30.0	16.0
Arco Petroleum Products Co.				
Carson, Cal.	ref. gas	. . . .	180.0	. . . .
Cherry Point, Wash.	ref. gas	. . . .	170.0	. . . .
Houston, Tex.	ref. gas	. . . .	350.0	. . . .
Ashland Petroleum Co.				
Canton, Oh.	refinery	Claus	99.8	17.8
Catlettsburg, Ky.	refinery	Claus	199.6	98.8
St. Paul Park, Mn.	refinery	Claus	39.9	14.6
BP Oil Corp.				
Belle Chasse, La.	ref. gas	Claus-Scot	50.0	. . . .
Marcus Hook, Pa.	ref. gas	Claus-Scot	160.0	. . . .
Cenex				
Laurel, Mont.	ref. gas	Claus	48.7	20.0
Champlin Petroleum Co.				
Corpus Christi, Tex.	crude oil	Claus	240.0	205.0
Wilmington, Cal.	crude oil	Claus	107.0	80.0
Chevron U.S.A. Inc.				
Carter Creek, Wyo.	nat. gas	. . . .	907.0	
Cincinnati, Oh.	ref. gas	. . . .	10.1	. . . .
El Paso, Tex.	ref. gas	. . . .	42.0	. . . .
El Segundo, Cal.	ref. gas	. . . .	750.0	. . . .
Pascagoula, Miss.	ref. gas	. . . .	1,090.0	. . . .
Philadelphia, Pa.	ref. gas	. . . .	46.7	. . . .
Port Arthur, Tex.	ref. gas	. . . .	469.3	. . . .
Richmond, Cal.	ref. gas	. . . .	600.0	. . . .
Salt Lake City, Ut.	ref. gas	. . . .	12.0	. . . .
Citgo Petroleum Corp.				
Lake Charles, La.	ref. gas	Claus-BSRP	330.0	330.0

Company and location	Source	Type of process	— Metric tons/day — Design capacity	Production
Coastal Refining & Marketing Inc.				
Corpus Christi, Tex.	ref. gas	Claus	85.0	60.0
Conoco				
Commerce City, Colo.	ref. gas	Claus	19.0	16.0
Westlake, La.	ref. gas	Claus	290.0	195.0
Cosden Oil & Chemical Co.				
Big Spring, Tex.	refinery	....	50.0	46.0
Crown Central Petroleum Corp.				
Pasadena, Tex.	ref. gas	Claus	14.3	11.0
Diamond Shamrock Corp.				
Moore County, Tex.	nat. gas	Claus	30.5	17.0
El Paso Hydrocarbons Co.				
Foster, Ector County, Tex.	nat. gas	Claus	20.0	13.0
Enron Corp.				
Hobbs, N.M.	nat. gas	Claus	30.5	4.8
Pecos, Texas	nat. gas	Claus	55.9	12.9
Exxon Co.				
Atascosa County, Tex.	nat. gas	2 reactor split flow Claus	...	5.4
Baton Rouge, La.	refinery	Claus	599.0	281.0
Baytown, Tex.	refinery	Claus	1,123.0	478.0
Benicia, Cal.	refinery	Claus	275.0	169.0
Crane County, Tex.	nat. gas	2 reactor Claus	....	14.9
Escambia County, Ala.	nat. gas	3 reactor Claus	....	818.7
Linden, NJ	refinery	Claus	393.0	116.0
Lincoln and Sweetwater Counties, Wyo.	nat. gas	Claus	....	409.7
Santa Rosa County, Fla.	nat. gas	3 reactor Claus	....	208.2
Farmland Industries Inc.				
Coffeyville, Kan.	refinery	Claus	19.8	8.1
Fina Oil & Chemical Co.				
Big Spring, Tex.	ref. gas	Claus	50.0	45.0
Port Arthur, Tex.	ref. gas	Claus-Scot	182.0	50.0
Fletcher Oil & Refining Co.				
Carson, Cal.	ref. gas	Locat	10.0	3.0
Frontier Oil & Refining Co.				
Cheyenne, Wyo.	ref. gas	Claus-Scot	45.7	26.5
Hawaiian Independent Refinery Inc.				
Ewa Beach, Hi.	ref. gas-LPG	Claus	14.0	10.5
Ewa Beach, Hi.	ref. gas-LPG	Claus	5.1	0
Hill Petroleum Co.				
Houston, Tex.	ref. gas	Claus	165.0	30.0
Hunt Refining Co.				
Tuscaloosa, Ala.	ref. gas	Claus	80.0	27.0
Koch Hydrocarbon Co.				
McKenzie County, ND	nat. gas	....	187.0	100.0
Harmony, Miss.	nat. gas	....	10.0	2.0
Koch Refining Co.				
Corpus Christi, Tex.	ref. gas	....	50.0	7.0
St. Paul, Minn.	ref. gas	....	425.0	400.0
LaGloria Oil & Gas Co.				
Tyler, Tex.	refinery	3 bed Claus	9.9	5.7
Louisiana Land & Exploration Co.				
Saraland, Ala.	refinery	Claus	54.9	0
Mapco Petroleum Inc.				
Memphis, Tenn.	ref. gas	Claus-Scot	43.0	14.0
Marathon Oil Co.				
Detroit, Mich.	refinery	Claus	81.3	32.2
Eddy County, NM	nat. gas	3 bed Claus	25.4	2.0
Garyville, La.	refinery	Claus	457.2	196.6
Park County, Wyo.	nat. gas	3 bed Claus	4.7	4.0
Pecos County, Tex.	nat. gas	3 bed Claus	50.0	26.0
Robinson, Ill.	refinery	Claus	40.6	24.1
Mobil Oil Corp.				
Beaumont, Tex.	ref. gas	Claus	100.0	30.0
Ferndale, Wash.	ref. gas	Claus	19.5	12.0
Joliet, Ill.	ref. gas	Claus	315.0	270.0
Paulsboro, NJ	ref. gas	Claus	135.0	60.0
Paulsboro, NJ*	ref. gas	Claus	135.0	....
Torrance, Cal.	ref. gas	Claus	200.0	140.0
Torrance, Cal.*	ref. gas	Claus	100.0	....
*Standby units.				
Montana Sulfur & Chemical Co.				
East Billings, Mont.	ref. gas	Claus	225.0	100.0
Murphy Oil USA Inc.				
Meraux, La.	ref. gas	....	35.0	12.0
Superior, Wis.	ref. gas	....	14.0	7.0
Newhall Refining Cl				
Newhall, Cal.	refinery	....	7.5	7.0
Oxy Cities Service NGL Inc.				
Lignite, ND	nat. gas	....	14.0	5.0
Milnesand, NM	nat. gas	....	23.0	9.8
Myrtle Springs, Tex.	nat. gas	....	304.0	180.0
Welch, Tex.	nat. gas	....	1.5	0.8
West Seminole, Tex.	nat. gas	....	10.0	6.6
Pennzoil Products Co.				
Shreveport, La.	ref. gas	Claus	11.7	2.2
Phillips 66 Co.				
Andrews, Tex.	nat. gas	Claus	18.0	....
Birthright, Tex.	nat. gas	Claus	30.5	....
Borger, Tex.	refinery	Claus	240.0	....
Chatom, Ala.	nat. gas	Claus	193.0	....
Crane, Tex.	nat. gas	Claus	88.0	....
Eunice, NM	nat. gas	Claus	64.0	....
Fullerton, Tex.	nat. gas	Claus	61.0	....
Goldsmith, Tex.	nat. gas	Claus	145.0	....
Lee, NM	nat. gas	Claus	62.0	....
Sweeny, Tex.	refinery	Claus	275.0	....
Rock Island Refining Corp.				
Indianapolis, Ind.	ref. gas	Claus	20.3	3.0
Shell Oil Co.				
Bryans Mill, Tex.	nat. gas	Claus	175.0	....
Clark Avenue, Cal.	nat. gas	Claus-Scot	4.0	....
Deer Park, Tex.	refinery	Claus-Scot	410.0	....
Frederic 10, Mich.	nat. gas	Claus	20.0	....
Goodwater, Miss.	nat. gas	Claus	40.0	....
Manistee County, Mich.	nat. gas	Claus	25.0	....
Martinez, Cal.	refinery	Claus-Scot Stretford	225.0	....
Norco, La.	refinery	Claus-Scot	45.0	....
Thomasville, Miss.	nat. gas	Claus	1,245.0	....
Wilmington, Cal.	refinery	Claus-Scot	200.0	....
Wood River, Ill.	refinery	Claus-Scot	300.0	....
Sid Richardson Carbon & Gasoline Co.				
Winkler County, Tex.	nat. gas	....	20.0	8.8
Sinclair Oil Corp.				
Sinclair, Wyo.	ref. gas	Claus	25.4	13.5
Smackover-Shell Ltd.				
Henderson County, Tex.	nat. gas	Claus-Scot	660.0	....
Standard Oil Co.				
Lima, Oh.	ref. gas	Claus	40.0	....
Toledo, Oh.	ref. gas	Claus-Scot	112.0	....
Tenneco Oil Co.				
Chalmette, La.	ref. gas	Claus	360.0	180.0
Texaco Inc.				
Anacortes, Wash.	ref. gas	Claus	51.0	....
Bakersfield, Cal.	ref. gas	Claus	19.0	....
Convent, La.	refinery	Claus	660.0	....
Delaware City, Del.	ref. gas	Claus	427.0	....
El Dorado, Kan.	ref. gas	Claus	178.0	....
Franklin County, Tex.li	nat. gas	Claus	223.0	93.0
Freestone County (Aker), Tex.	nat. gas	....	180.0	76.0
Freestone County (Teas), Tex.	nat. gas	....	140.0	67.0
Port Arthur, Tex.	ref. gas	Claus	238.0	....
Wilmington, Cal.	ref. gas	Claus	238.0	....
Texas Oil & Gas Corp.				
Coyanosa, Tex.	nat. gas	Claus	20.0	7.0
Pittsburg, Tex.	nat. gas	Claus	100.0	45.3
Teague, Tex.	nat. gas	Claus	10.0	2.4
Tosco				
Martinez, Cal.	ref. gas	Claus-Scot	170.0	115.0
Total Petroleum Inc.				
Alma, Mich.	ref. gas	....	13.0	6.0
Ardmore, Ok.	ref. gas	....	15.0	10.0
Trans-Jeff Chemical Corp.				
Tilden, Tex.-No. 1	acid gas	Chance Claus	19.8	....
Tilden, Tex.-No. 2	acid gas	Chance Claus	74.9	19.0
Unocal Corp.				
Lemont, Ill.	ref. gas	Claus Bevon Stretford	300.0	....
Lemont, Ill.	ref. gas	Claus	100.0	....
Nederland, Tex.	ref. gas	Claus	17.0	....
Rodeo, Cal.	ref. gas	Claus Stretford	350.0	....
Santa Maria, Cal.	ref. gas	Claus Unisulf	139.0	....
Wilmington, Cal.	ref. gas	Claus Stretford	200.0	....
Valero Refining Co.				
Corpus Christi, Tex.	ref. gas	....	310.0	104.0
Warren Petroleum Co.				
Como, Hopkins County, Tex.	nat. gas	....	75.0	17.0
Fashing, Atascosa County, Tex.	nat. gas	....	36.0	16.0
Little Knife, Billings County, ND	nat. gas	....	125.0	100.0
Monument, Lea County, NM	nat. gas	....	32.0	15.0
Sand Hills, Crane County, Tex.	nat. gas	....	52.0	40.0
VENEZUELA				
Corpoven				
El Palito, Carabobo	refinery	Claus	42.0	24.0
Lagoven				
Amuay, Falcon	refinery	Claus	600.0	231.0
Maraven				
Cardon, Falcon	refinery	Claus	94.0	16.0

OGJ REPORT

Annual
Petrochemical
Report

Petrochemical producers regain strength

Richard A. Corbett
Refining/Petrochemical Editor

Petrochemical producers worldwide are regaining strength after the almost disasterous results of the past few years. Some of the improved performance and outlook is the result of the drop in crude prices that began in early 1986.

The Journal's annual compilaton of worldwide ethylene capacity in this report shows that the 4-year excess in ethylene capacity is rapidly disappearing.

In the U.S. and worldwide, olefin plants are running close to 90% utilization. This level of utilization is, for the most part, maximum capacity.

Much of the improved strength is the result of increased demand for petrochemical derivative products, particularly plastics, and the restructuring and shutdown of inefficient facilities.

The high oil prices of the early 1980s that meant high petrochemical feedstock and fuel costs, forced petrochemical producers to slash operating costs, particulary energy useage. The significant point about reduced energy useage is that the improvements are permanent. Now, producers have the combined advantages of lower fuel costs and the need for less fuel.

Improved economic conditions have spurred healthy demand growth in plastics, the biggest home for basic petrochemicals. Added to that, new materials and applications are hitting the market at a rapid pace.

All of the improved strength must be weighed against the potential for oil prices to remain in the $20/bbl range. And both demand growth and good profitability could decline beyond 1995 as a resulte of an anticipated slow down in the world economy by then.

Also, the industry worries that possible capacity shortages that might crop up as early as 1988-1990, could spur another round of massive capacity increases that would put the industry back into the position it faced in the early 1980s when it had to endure large capacity excesses and poor utilization rates.

A look at one product and ethylene derivative, styrene, shows how its demand is increasing during the near term, but that capacity increases will dim the prospects after 1990.

Also, some of the new technology being used to improve operating efficiency and productivity of petrochemical plants is reviewed.

A technical article in this special section shows how petrochemical plants can increase flexibility by producing ammonia from plant off gases.

Ethylene capacity. The Journal's latest survey of worldwide petrochemical facilities shows a slight rise in capacity as of June 1, 1987 (Table 1). An interesting note is that no area of the world lost or gained significant capacity.

The slight increases can be attributed to debottlenecking of existing facilities because no new large-scale plants were started in 1986. Table 2 gives capacities of individual producing plants.

Outlook bright. For basic petrochemicals, the outlook is bright for at least the next few years. Demand for the basics is up and should remain so into the 1990s.

U.S. production of the basics also showed good growth during 1986. of the basic petrochemicals, ethylene production rose from 29.8 billion lb in 1985 to 32.8 billion lb in 1986, according to U.S. International Trade Commission (ITC) data. Estimates put ethylene production for 1987 at 35 billion lb.

Propylene production in 1986 was 17.3 billion lb compared to 14.9 billion lb the previous year, according to ITC. Propylene production in 1987 is expected to be about 22 billion lb.

By 1990, forecasts by Chemical Market Asociates Inc. show annual U.S. demand at 36-36.5 billion lb for ethylene and 20 billion lb for propylene (OGJ, July 20, p. 17).

Increased demand is also forcast for other selected ethylene based products. For instance, styrene monomer demand will increase from 7.5 billion lb in 1986 to 8.8 billion lb in 1990. Demand for high density polyethylene (HDPE) is expected to climb from 7.2 billion lb to 8.2 billion lb and both low density (LDPE) and linear low density polyethylene (LLDPE) is expected to rise from 8.9 billion lb in 1986 to 10.4 billion lb in 1990.

The outlook is equally bright for Western European producers, according to Pierre de Tillesse, vice-chairman of Petrofina S.A., Brussels. In a presentation at the National Petroleum Refiners Association International Petrochemical Conference in San Antonio in April, he said the petrochemical situation in Europe began to turn around in 1983.

A strengthening U.S. economy coupled with a favorable exchange rate of European currancies against the dollar made huge exports possible. That, and an upswing in European domestic demand, resulted in reasonable utilization rates with a considerable improvement in profitability. Utilization rates of ethylene plants for instance, have risen from 71% in 1981 to 84% in 1985 and up to 91% in 1986, according to Tillesse.

The start up of Mid East petrochemical facilities posed a threat to European markets. But most of the capacity that came on stream in 1985 was absorbed by high demand at the time, according to Tillesse. But the addition of the Mid East capacity could have limited any increase in cost effectiveness brought about by plant shut downs and improved operating efficiency. The sharp drop in crude oil prices in 1986 eased the problem. That had a very positive effect on performance for European petrochemical producers, according to Tillesse. Primarily, product prices didn't fall as fast as feedstock costs. Tables 3 and 4 show the European demand estimates for 1990 for ethylene and propylene and their derivatives.

Table 1

Ethylene capacity by country

	1,000 metric tons/year		
Area	**1985**	**1986**	**1987**
North America			
U.S.	17,298	16,778	16,820
Canada	2,242	2,242	2,242
Total	**19,540**	**19,020**	**19,020**
Latin America			
Argentina	253	253	254
Bolivia	230	230	230
Brazil	1,427	1,428	1,461
Chile	60	60	60
Colombia	115	115	115
Mexico	932	932	932
Puerto Rico	413	413	413
Venezuela	150	150	150
Total	**3,580**	**3,581**	**3,615**
Western Europe			
Austria	285	285	320
Belgium	520	520	520
Finland	200	200	200
France	2,270	2,415	2,400
West Germany	3,990	3,660	3,790
Greece	15	15	15
Italy	1,485	1,485	1,485
The Netherlands	2,260	2,260	2,285
Norway	300	300	390
Portugal	300	300	300
Spain	956	956	966
Sweden	360	365	365
Switzerland	30	30	30
U.K.	2,270	1,995	1,845
Total	**15,291**	**14,786**	**14,911**
Asia/Pacific			
Australia	420	420	420
India	252	252	256
Japan	5,581	5,418	5,357
Korea	505	505	505
Singapore	300	300	300
Taiwan	953	953	953
Total	**8,011**	**7,848**	**7,791**
Other			
Algeria	120	364	364
Iran	26	26	26
Israel	24	130	130
Qatar	280	280	280
Saudi Arabia	1,611	1,611	1,611
South Africa	150	150	150
Turkey	355	355	355
Total	**2,566**	**2,916**	**2,916**
World total	**48,988**	**48,151**	**48,295**

* As of June 1, 1987.

Table 2

Installed ethylene capacity: 1987*

Company	Location	Capacity, 1,000 metric tons/year	Feedstock†	Coproducts	Capacity, 1,000 metric tons/year§
Allied Corp. (with Borg Warner & BASF-Wyandotte)	Geismar, La.	325	E,P	Propylene	21
				Butadiene	16
Amoco Chemicals Co.	Chocolate Bayou, Tex.	975	E,P,N	Propylene	390
				Butadiene	91
				Aromatics	85
Aristech Chemical Corp.	Houston, Tex.	227	NGL,R,P	Propylene	75
B.F. Goodrich	Calvert City, Ky.	136	P	Propylene	90
Chevron Chemical Co.	Port Arthur, Tex.	432	LPG	Propylene	175
				Butadiene	22
	Baytown, Tex.	730	R,N,G	Propylene	355
				Butadiene	190
Cain Chemical Inc.	Corpus Christi, Tex.	635	LPG,N,G, Toluene	Propylene	260
				Butadiene	95
				Aromatics	225
	Alvin, Tex.	465	LPG,N,G, Toluene, Drip oil	Propylene	270
				Butadiene	60
				Aromatics	200
Dow Chemical	Freeport, Tex.	1,136	E,P,B,N	Propylene	250
				Butadiene	39
	Plaquemine, La.	682	E,P,B,N	Propylene	75
Du Pont Petrochemical	Orange, Tex.	375	E,P	Propylene	—
				C_4	—
El Paso Products Co.	Odessa, Tex.	236	E,P	Propylene	65
				Butadiene	4
				Aromatics	15
Exxon Chemical U.S.A.	Baton Rouge, La.	590	E,P N,G	Propylene	400
				Butadiene	—
				Aromatics	—
	Baytown, Tex.	590	N,G	Propylene	408
				Butadiene	113
Fina Oil & Chem.	Groves, Tex.	9	R	Propylene	30
Lyondell Chemical Co.	Channelview, Tex.	1,270	E,P,N,G	Propylene	725
				Butadiene	200
				Py. gas	1,180
				Aromatics	220
				Fuel oils	670
Mobil Chemical Co.	Beaumont, Tex.	476	LPG,N	Propylene	110
				Butadiene	35
				Aromatics	35
				Py gas	85
Phillips 66 Co.	Sweeney, Tex.	1,143	E,P	Propylene	170
				Butadiene	44
Shell Chemical	Deer Park, Tex.	812	NGL,R	Propylene	485
				Butadiene	113
	Norco, La.	1,016	NGL,R	Propylene	635
				Butadiene	226
Sun-Olin Chemical Co.	Claymont, Del.	109	R	—	—
Texaco	Port Arthur, Tex.	475	NGL,N,G	Propylene	238
				Butadiene	51
				Py gas & Aromatics	224
				Fuel oils	111
	Port Neches, Tex.	170	E,P	Propylene	40
				Butadiene	13
				Py gas & Aromatics	27
				Fuel oils	3
Texas Eastman Co.	Longview, Tex.	590	E,P,N	Propylene	270
				Aromatics & Py gas	80
				Fuel Oils	5
Union Carbide	Seadrift, Tex.	562	E,P	Propylene	46
				Butadiene	—
				Aromatics	—
	Taft, La.	500	LPG,N	Propylene	193
				Butadiene	—
				Aromatics	—
	Texas City, Tex.	702	LPG,N	Propylene	136
				Butadiene	—
				Aromatics	—
U.S.I.	Deer Park, Tex.	180	E	—	—
USI Chemical Co.	Morris, Ill	430	E,P,B	Propylene	110
				Butadiene	15
				Py gas	25
	Clinton, Iowa	365	E,P	Propylene	14
				Butadiene	17
				Py gas	24
				Fuels	124
	Tuscola, Ill.	182	E,P	—	—
Vista Chemical Co.	West Lake, La.	295	E	Propylene	8
				Butadiene	15
				Aromatics	8
U.S. Total		**16,820**			
ALGERIA					
Sonatrach	Arzew	364	LNG	—	—
ARGENTINA					
Duperial S.A.I.C.	San Lorenzo	15	N	Propylene	6
				Py gas	6
				Fuel oils	6
Ipako	Ensenada	15	R	—	—
PASA Petroquimia Arg.	Pto. Gral. San Martin	23	P	—	—
Petroquimica Bahia Blanca	Bahia Blanca	201	E	C_3	6
				C_4	9
				Py gas	7
Argentina Total		**254**			
AUSTRALIA					
Altona Petrochem. Co. Ltd.	Altona, Victoria	170	E,G	Propylene	50
				Butadiene	17
ICI Australia	Botany, NSW	250	N,LPG	Propylene	95
				Butadiene	23
				Fuel oils	16
				Py gas	70
Australia total		**420**			
AUSTRIA					
OMV A.G.	Schwechat	320	B,N,G,R	Propylene	160
				Butadiene	50
BELGIUM					
Petrochem S.A.	Antwerp	520	N	Propylene	230
				Butadiene	65
				Aromatics	230
				Fuel oils	85
				Py gas	150
BOLIVIA					
Yacimientos Petroliferos Bolivianos	La Paz	230	E,P	Propylene	56
				Py gas	22
BRAZIL					
Brasiliera de Estireno	Cubatao	5	EtOH	—	—
Industrias Quimicas Electro Cloro	Elclor	11	EtOH	—	—
Copene Petroquimica	Camaracari-Bahia	460	N,G	Propylene	272
				Butadiene	79
				Py gas	420
				Aromatics	200
Copesul	Triunfo RS	453	N	Propylene	241
				Butadiene	77
				Py gas	190
				Aromatics	242
				Fuel oils	75
Coperbo	Cabo	32	EtOH	—	—
Petroquimica Uniao S.A.	Santo Andre	360	N	Propylene	204
				Py gas	103
				Butadiene	50
				Aromatics	312
Salgema Industrias Quimicas S.A.	Maceio-Alagoas	100	EtOH	—	—
Union Carbide	Cubatao	40	EtOH	—	—
Brazil total		**1,461**			
CANADA					
Alberta Gas Ethylene Co. Ltd.	Joffre, Alta.	1,224		Propylene	35
				Butadiene	51
				Aromatics	50
Dow Chemical	Sarnia, Ont.	50	P,B,R	Propylene	—
Imperial (Esso Chemical)	Sarnia, Ont.	220	NGL	Propylene	40
				Butadiene	8
				Py gas	25
Petromont	Varnenes, Que.	225	N	Propylene	—
	Montreal East	68	P,R	Propylene	60
				Butadiene	2
				Py gas	2
				Aromatics	6
Polysar Ltd.	Corunna (Sarnia), Ont.	455	E,N,G	Propylene	330
				Butadiene	91
				Aromatics	125
Canada total		**2,242**			
CHILE					
Petrox S.A.	Talcahuano	60	N	—	—
COLOMBIA					
Empresa Colombiana	Barrancabermeja	115	E,R	Propylene	6
				Py gas	5
FINLAND					
Neste Oy	Porvoo	200	N,G, R,NGL	Propylene	90
				Butadiene	20
FRANCE					
Atochem	Lavera	250	E,N	Propylene	185

(Continued)

Installed ethylene capacity: 1987* (continued)

Company	Location	Capacity, 1,000 metric tons/year	Feedstock†	Coproducts	Capacity, 1,000 metric tons/year§
				Butadiene	50
				Aromatics	50
	Feyzin	120	E,N	Propylene	70
				Butadiene	30
				Aromatics	30
	Gonfreville	370	E,N	Propylene	220
				Butadiene	79
				Aromatics	150
	Lacq	70	E	—	—
BP Chimie	Lavera	240	LPG,N	Propylene	155
				Butadiene	50
CdF Chimie	Charling & Lillebonner	420	N,G	Propylene	220
				Butadiene	130
				Py gas	55
				Aromatics	360
				Fuel oils	260
Copenor	Dunkerque	250	N,G,LPG	Propylene	120
				Butadiene	75
				Py gas	40
				Aromatics	170
				Fuel oils	175
Shell Chimie	Berre	380	N,G,LH		
Esso Chimie	Notre Dame de Gravenchon	300	N,R	Propylene	220
				Butadiene	70
				Py gas	310
France total		**2,400**			
GERMANY					
BASF A.G.	Ludwigshafen	450	N	Propylene	240
				C_4	150
				Py gas	264
Deutsche Marathon	Burghausen	280	N,R	Propylene	130
				Butadiene	90
				Fuel oil	2
Deutsche Texaco A.G.	Heide	80	N	Propylene	55
				C_4	28
Erdolchemie G.m.b.H.	Worringen	740	N	Propylene	520
				Butadiene	245
				Aromatics	200
Esso Chemie G.m.b.H	Cologne	450	N	Propylene	240
				C_4	38
Hüls AG	Marl	50		—	—
Rheinische Olefinwerke	Wesseling	650	N,G,P	Propylene	300
				Butadiene	150
				Py gas	520
Union Rheinische Braun-Kohlen Krafstoff A.G.	Wesseling	440	N,G,R LH	Propylene	260
				C_4	150
				Py gas	595
				Fuel oils	165
Ruhr Oel A.G.	Gelsenkirchen	400	N	Propylene	245
	Munchmunster	200	N	Propylene	130
Chemische Werke Huls	Marl	50	LPG	—	—
Germany total		**3,790**			
GREECE					
EKO Chemicals Co.	Thessaloniki	15	N	Py gas	10
INDIA					
Alkali & Chemical Corp.	Rishra, W. Bengal	12	EtOH	—	—
Chemicals & Plastics India	Krishnagiri	19	EtOH	—	—
McDowell & Co.	Visakhapatnam	3	EtOH	—	—
India Petrochem Corp.	Baroda	130	N	Propylene	81
				Butadiene	22
				Benzene	24
				Py gas	29
				Aromatics	20
National Organic Chemicals Industries Ltd.	Thane, Bombay	63	N	Propylene	37
				Butadiene	7
Polychem Ltd.	Bombay	2	EtOH	—	—
	Nira	4	EtOH	—	—
Reliance Textile Ind.	Bombay	22	N	Propylene	6
				Benzene	3
				Aromatics	6
				Fuel oils	6
Synthetics & Chemicals Ltd.		4	Etoh	—	—
India total		**256**			
IRAN					
Abadan Petrochemical	Abadan	26	R	Propylene	15
ISRAEL					
Oil Ref. Ltd.	Haifa	130	N,R,LPG	—	—
ITALY					
Enichem	Gela	200	E,N	Propylene	160
				Butadiene	40
				Py gas	280
				Aromatics	150
				Fuel oils	55
	Priolo	215	N	Propylene	150
	Bindisi	130	N	Propylene	85
				Butadiene	120
	Porto Tores	240	N	Propylene	121
				Butadiene	50
ICAM	Priolo	550	N,G	Propylene	350
Montedipe	Porto Marghera	350	N	Propylene	180
Italy total		**1,485**			
JAPAN					
Idemitsu Petrochem Co. Inc.	Tokuyama	380	N	Propylene	220
Maruzen Petrochem Co. Inc.	Goi	373	N	Propylene	220
				Butadiene	55
				Aromatics	240
Mitsubishi Chemical Industries	Mizushima	360	N,LPG	Propylene	216
Mitsubishi Petrochemical Co. Inc.	Kashima	299	N,LPG	—	—
	Yokkaichi	211	N,LPG	—	—
Mitsui Petrochemical Inds.	Chiba	140	N	Propylene	68
				Py gas	90
				Fuel oils	30
	Iwakuni-Ohtake	92	N	Propylene	69
				Py gas	64
Mizushima-Ethylene	Mizushima	360	N,LPG	Propylene	216
				Py gas	250
				Fuel oils	50
Nippon Petrochemicals	Kawasaki	190	N,LPG	Propylene	148
				Butadiene	50
Osaka Petrochemicals Inds.	Osaka	300	N,B	Propylene	200
				Aromatics	225
Sanyo Ethylene Co.	Mizushima	390	N	Propylene	254
Shin Daikyowa Petrochemical Co.	Yokkaichi	300	N	Propylene	156
				Butadiene	44
				Py gas	220
				Aromatics	124
Showa Denko, K.K.	Ohita	320	N,LPG	Propylene	170
				Butadiene	45
				Aromatics	160
Sumitomo Chem. Co. Ltd.	Chiba	345	N,LPG	Propylene	252
	Nihama	139	N	Propylene	123
Tonen Petrochemical Co. Ltd.	Kawasaki	350	N,LPG	Propylene	224
				Butadiene	105
Ukishima Petrochem Co. Ltd.	Ukishima & Chiba	808	N	Propylene	417
Japan total		**5,357**			
KOREA					
Honam Ethylene Co.	Yeochun	350	N,G,LPG	Propylene	187
				C_4	129
				Aromatics	155
				Py gas	302
				Fuel oils	98
Yukong Ltd. (formerly Korea Oil)	Ulsan	155	N	Propylene	81
				Butadiene	24
Korea total		**505**			
MEXICO					
Petroleos Mexicanos	Cangrejera	500	Propylene		27
	Pajaritos	209	E		
	Poza Rica	182	E	Propylene	9
	Reynosa	27	LH		
	Ciudad Madero	14	R		
Mexico total		**932**			
THE NETHERLANDS					
Dow Chemical Europe	Terneuzen	960	N	Propylene	450
				Benzene	600
				Butadiene	150
DSM	Limburg	800	N,G,LPG	Propylene	450
				Benzene	160
				Butadiene	110
Shell Nederland Chemie BV	Moerdijk	525	N,G,LPG	Propylene	300
				Butadiene	115
Netherlands total		**2,285**			
NORWAY					
I/S Noretyl	Rafnes	390	NGL	Propylene	70
PORTUGAL					
Companhia Nacional de Peroquimica	Sines	300	LPG,N	Propylene	140
				Butadiene	42
				Py gas	220
				Fuel oils	24

(Continued)

Table 2 (continued)

Installed ethylene capacity: 1987* (continued)

Company	Location	Capacity, 1,000 metric tons/year	Feedstock†	Coproducts	Capacity, 1,000 metric tons/year§
PUERTO RICO					
Union Carbide Caribe Inc.	Ponce	413	N,LPG	Propylene	227
QATAR					
Qatar Petrochemical	Umm Said	280	E	Propylene	5
SAUDI ARABIA					
Saudi Petrochemical Co.	Al-Jubail	656	E	—	—
Arabian Petrochemical Co.	Al-Jubail	500	E	—	—
Saudi Yanbu Petrochem. Co.	Yanbu	455	E	—	—
Saudi Arabia total		1,611			
SINGAPORE					
Singapore Petro-Chemical	Singapore	300	LPG,N	Propylene	—
SOUTH AFRICA					
So. Africa Coal Oil & Gas Co.	Sasolburg	150	Syn. gas	Propylene	120
				Butadiene	27
				Aromatics	20
SPAIN					
Dow	Tarragona	350	N	Propylene	130
				Butadiene	50
				Py gas	300
EMP	Puertollano	210	N,R	Propylene	90
	Tarragona	335	LPG,N	Propylene	165
Industrias Quimicas Asociadas S.A.	Tarragona	71	N	Propylene	36
				Butadiene	7.5
				Aromatics	40
Spain total		966			
SWEDEN					
Statoil Petrochemie A/B	Stenungsund	365	LPG,N,G	Propylene	165
SWITZERLAND					
Lonza, A.G.	Visp	30	N,LPG	Acetylene	
TAIWAN					
Chinese Petro. Corp.	Koahsiung	899	N,G	Propylene	437
				Butadiene	130
China Petrochemical Development Corp.	Toufen	54	E	—	—
Taiwan total		953			
TURKEY					
Petkim Petrokimya A.S.	Izmit	55	N	Propylene	40
				C_4	26
				Py gas	58
				Fuel oils	8
	Izmir	300	N	Propylene	88
				C_4	80
				Py gas	250
Turkey total		355			
UNITED KINGDOM					
BP Chemicals	Baglan Bay	340	N	Propylene	200
				Butadiene	60
	Grangemouth	250		Propylene	180
				Butadiene	48
BP/ICI	Wilton	650	N,LPG	Propylene	300
				Butadiene	80
Essochem Olefins Inc.	Fawley	105	N,G	Propylene	100
				Butadiene	80
	Fife	500	E		
U.K. total		1,845			
VENEZUELA					
Pequiven	El Tablazo	150	E,P	Propylene	45
				Aromatics	13
WORLD TOTAL ***(As of June 1, 1986)**		48,285			

†Key: E = ethane, P = propane, B = butane, R = refinery streams, N = naphtha, G = gas oil, LH = light hydrocarbons, NGL = natural gas liquids (ethane, propane, butane), LPG = liquefied petroleum gas (propane, butane), EtOH = ethanol

§ Coproduct production is only estimated or design quality. Actual production can vary widely depending on feedstock slate, severity, etc.

Styrene demand strong. The strong growth in petrochemicals, for the most part, lies in the rapid growth in demand for plastics. In the U.S., plastics resins demand is expected to increase to 76 billion lb/year by 2000 from 48 billion lb/year in 1985 (OGJ, July 20, p. 17). As an example, styrene demand, production, and capacity are given.

Styrene is currently in tight supply and is experiencing rapidly increasing prices, according to Thomas L. Caltrider of Borg Warner Chemicals, Parkersburg, W. Va., in a presentation to the DeWitt & Co. 1987 Petrochemical Review in Houston in April.

U.S. capacity, demand, and production estimates show strong utilization rates through 1989, then a dramatic fall off in 1990 as new capacity comes on stream, demand falls off in 1990 caused by a forecast moderate recession, and net export trade drops (Table 5). Capacity increases are based on an estimate of not-yet-announced styrene capacity that will probably be built during the next 5-7 years.

Caltrider expects European producers to also cash in on the current styrene boom and add up to 600,000 metric tons of capacity. European capacity, production and demand data is shown in Table 5.

Japan significantly restructured its styrene capacity between 1980 and 1984, according to Caltrider.

As a result, capacity is 70,000 metric tons/year less today than it was in 1980.

Table 5 shows the capacity, production, and demand situation for Japan.

In other parts of the world, companies have announced more than a million metric tons of styrene capacity additions through 1990 with an additional 484,000 metric tons either scheduled for start up between 1990 and 1994, or not yet scheduled, according to Caltrider.

When forecast demand is compared to forecast capacity additions, including estimates of worldwide unannounced capacity additions that will most likely occur, worldwide styrene capacity utilization will be very good at a 92-93% level through 1989, according to Caltrider. Then, as much of the new capacity reaches the market along with a reduction in demand, utilization rates will crash along with prices and profitability. A worldwide summary of styrene capacity and demand is shown in Table 5.

Improved technology. A primary contributor to the improved picture in petrochemicals production is the substantial product cost reductions that have occurred during the past several years. High crude oil prices provided the sharp spur to make the necessary reductions.

During the last 10 years, ethylene plants for instance, have achieved significant reductions in energy consumption. In 1978, ethylene plants, on the average, consumed 14,400 BTU/lb of ethylene produced, according to Eric Hindmarsh and David Boland of Tensa Services Inc., Houston, in a paper presented at the AIChE meeting in March in Houston. By 1986, energy consumption had fallen to about 8,100 BTU/lb of ethylene.

A contributor to the energy consumption reductions is the use by many plants of pinch technology in the overall heat balance of a plant (OGJ, April 7, 1986, p. 54). Pinch analysis is based on fundamental thermodynamic principles and establishes the precise minimum energy needs of the process, and the most cost effective design for heat integration, according to Hindmarsh and Boland.

Hindmarch and Boland described the linkage of pinch technology to real

Table 3

Ethylene and its derivatives in western Europe

(1,000 metric tons of ethylene equivalent)

	1985	1990
LDPE/LLDPE	4.650	5.000
HDPE	2.050	2.300
Ethylene oxide	1.300	1.300
Ethylene dichloride	2.300	2.450
Ethyl benzene	850	900
Others	1.250	1.550
Ethylene consumption	12.400	13.500
Net foreign trade	– 200	– 200
Ethylene production	12.000	13.300
Nameplate capacity	14.500	14.250
Rate of utilization, %	84	95

Source: Petrofina S.A.

Table 4

Propylene and its derivatives in western Europe

(1,000 metric tons of propylene equivalent)

	1985	1990
Polypropylene	2.500	3.100
Acrylonitrile	1.250	1.300
Cumene	650	660
Propylene oxide	770	820
Isopropyl alcohol	450	470
Others	1.650	8.050
Propylene consumption	7.270	8.050
Net foreign trade	–270	–250
Propylene production	7.000	7.800
Nameplate capacity	8.500	8.700
Rate of utilization, %	82	90

Source: Petrofina S.A.

Table 5

Forecast styrene capacity, demand, and production

Year	Capacity, 1,000 metric tons	Domestic demand, 1,000 metric tons	Production, 1,000 metric tons	Utilization, %
U.S.				
1986	3843	3062	3447	90
1987	3843	3255	3701	96
1988	3963	3365	3850	97
1989	4163	3450	3975	96
1990	4463	3175	3520	79
1991	4663	3500	3895	84
1992	4663	3675	4125	89
Western Europe				
1986	3320	3150	3000	90
1987	3305	3250	3150	95
1988	3405	3350	3300	97
1989	3605	3400	3355	93
1990	3805	3230	3200	84
1991	3905	3450	3395	87
1992	3905	3650	3550	91
Japan				
1986	1459	1625	1420	97
1987	1459	1685	1450	99
1988	1559	1750	1540	99
1989	1729	1790	1595	92
1990	1819	1755	1500	83
1991	1819	1870	1575	87
1992	1819	1920	1600	88

	Total Probable capacity, million metric tons	Demand, million metric tons	utilization, %
World balance			
1987	12.35	11.45	93
1988	12.86	12.00	93
1989	13.48	12.36	93
1990	14.98	11.65	78
1991	15.28	12.70	83
1992	15.42	13.44	87

Source: Borg Warner Chemicals

time derivatives of process sumulation models at ICI Americas. With this linkage, control optimization was achieved that reduced operating costs over and above the cost reductions available through operational change and process retrofits.

Other ethylene plant efficiency improvements include the millisecond furnace technology of M.W. Kellogg Co., Houston, and the use of reversed, split furnace coils in olefins production developed by the University of Gent, Belgium (OGJ, Aug. 17, p. 41). Both of these technolgies improve selectivity to ethylene and increase ethylene yields in the cracking reaction.

Steam cracking remains the primary process for the production of olefinic base materials, and the cracking operation has achieved a very high degree of developement. Although additonal developments will be difficult in the cracking reaction, there is still room for improvement in the product recovery section of the process, according to Karl Griesbaum of the Engler-Bunte-Institut, University of Karlsruhe, West Germany, and Wolfgang Swodenk of Bayer AG, Leverkusen, West Germany, in a paper presented at the 12th World Petroleum Congress in Houston in April.

They described a process developed by IFP that makes use of a newly developed bimetallic promoted palladium catalyst in liquid phase hydrogenation. When applied to steam cracked C_2 and C_3 cuts, the process resulted in higher hydrogenation activity for the corresponding polyunsaturate components and concomitantly decreased oligomer formation, as well as reduced undesired olefin hydrogenation.

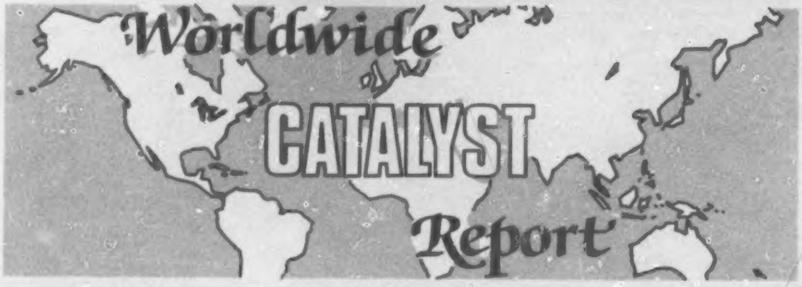
This resulted in an increase of the ethylene yield by 1% from a C_2 cut containing 1.5 wt% acetylene, and an increase of the propylene yield to 103.3% from a C_3 cut containing 4 wt% propyne and propadiene, according to Griesbaum and Swodenk.

What appeared a short time ago as an industry in decline, the petrochemicals industry has turned the corner and has improved its situation substantially.

Utilization rates are up because of increased demand and shedding of excess capacity, and profitability has improved because of reduced costs resulting from energy consumption reductions and improved processing techniques.

If crude oil prices remain in the $20/bbl range, and if companies don't rush to make excessive capacity additions, the industry should see a period strength for the next few years. ▪

OGJ REPORT



More specialization coming from catalyst suppliers

Richard A. Corbett
Refining/Petrochemical Editor

Worldwide catalyst manufacturers and suppliers continued to add new petroleum-refining industry catalysts to the more than 900 already available, but at a slightly slower pace compared to previous years. According to the Journal's lastest survey, there were 94 new catalysts added during last year compared to more than 150 added in each of the two previous annual surveys.

This doesn't mean reduced activity in the industry. Rather, suppliers are concentrating more on effective application of catalysts previously introduced and on providing more customized formulations. Fluid catalytic cracking (FCC) catalysts continue to get the bulk of the attention of manufacturers with 45 new additions to that process catagory. Many of these are octane-enhancing catalysts in response to continued octane production needs fostered by the final stages of phaseout of lead in gasoline.

Hydrocracking and mild hydrocracking catalysts scored the second largest increase with 21 new additions to these catagories.

Close scrutiny of these and other process categories shows that several of the new catalysts are incremental modifications of existing catalysts that make them highly specific to finely tuned processes. This supports an apparent trend toward customized specialty catalysts, rather than toward bulk, general, purpose types, according to many in industry. Suppliers also eliminated about 33 catalysts that are no longer used or that have been replaced by improved catalysts.

Scope, purpose. OGJ's International Refining Catalyst Compilation lists catalysts from essentially all of the world's manufacturers and suppliers, for practically all catalytic refining processes.

The compilation is intended to meet two main objectives:

1. To list all catalysts by their specific designations in their specific area of process application, for instance, catalytic reforming and hydrotreating.
2. To differentiate in some way each catalyst from another, i.e., to explain why one has a different designation from another.

The characteristics of the listed catalysts are furnished by the manufacturers or suppliers of the catalysts. If a supplier offers two or more families of catalysts in a single process area, the objective is to describe how the families differ on the basis of physical, chemical, or functional characteristics. And if there are several members in the family, how each differs from the others.

The information shown is the supplier's best effort to meet the objectives of the compilation. The blanks that appear in parts of the table reflect the supplier's response, and are not there because the information requested is not applicable or available. The symbol "P" appears occasionally to signify some proprietary aspect of a catalyst that the supplier chose not to divulge

The scope of the compilation includes all catalysts that are available by sale or license to refiners. Those that are available for general sale are denoted by a check mark in the far right column. Those that are only available through licensing arrangements are denoted by an L in the column. Custom catalysts for proprietary processes, unavailable to the general industry by themselves, are not listed.

The compilation is broken down alphabetically into the various refining processes, and further alphabetically by supplier. The nature of some catalyst types causes them to appear in more than one processing catagory. And in some cases, more than one supplier may list the same catalyst because of licensing or sales agreements.

Liberal abbreviations (see accompanying table) are used to try to include as much information as possible in the limited space of the compilation.

The compilation is designed to provide a ready reference for both refiners and manufacturers and to sort out the sometimes-confusing nomenclature used to designate or label them and to reveal the current catalysts available for various processes and for specific objectives.

OGJ international refining-catalyst compilation—1987

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
			Catalytic naphtha reforming					
AMERICAN CYANAMID CO.								
AEROFORM® PHF-5 & PHF-5A	Monometallic; differing particle size.	Naphtha	Gaso. or BTX	Cyl.	42	Al_2O_3	"P"	✓
PRHF-30 PRHF-37 PRHF-50 PRHF-58	Bimetallic, different amounts of active metals	Naphtha	Gaso. or BTX	Cyl.	"P"	"	"P"	L
KX-120, KX-130 KX-160	(See Exxon Research & Engineering listing)							L
TRILOBE® KX-130	(See Exxon Research & Engineering listing)			Sh. ext.			L	
AEROFORM® PHF-4 & PHF-4A	Monometallic; different particle sizes.	Naphtha	Gaso. or BTX	Cyl.	42	Al_2O_3	PtCl	✓
TRILOBE® P-8 & P-8A	Monometallic, high particle density, different particle sizes	Naphtha	Gaso. or BTX	Sh. ext.	44	"	PtCl	✓
AEROFORM® PR-6 & PR-6A	Bimetallic; different particle sizes.	Naphtha	Gaso. or BTX	Cyl.	42	"	Pt/ReCl	✓
TRILOBE® PR-8, PR-8A & PR-8E	Bimetallic, high particle density catalyst;different particle sizes	Naphtha	Gaso. or BTX	Sh. ext.	44	"	Pt/ReCl	✓
TRILOBE® PR-18 & PR-18A	Bimetallic, high particle density shaped skewed metals levels; different particle sizes	Low sulfur naphtha	Gaso. or BTX	Sh. ext.	44	"	Pt/ReCl	✓
IMP-RNA-2	(See Instituto Mexicano del Petroleo Listing			Sh. ext.				L
CHEVRON RESEARCH CO.								
Rheniforming Type F	Latest version, long cycle life stable product yields	Napthas, SR & cracked coal naphthas	Gas & Aro.	Cyl.	40	"P"	Pt/Re	L
CYANAMID KETJEN								
CK-303 CK-304 CK-305 CK-306	All monometallics, different active metal contents	Naphtha	Gaso. or BTX	Cyl.	44	Al_2O_3	PtCl	✓
CK-433	Bimetallic	Naphtha	Gaso. or BTX	Cyl.	44	"	Pt/ReCl	✓
CK-522 TRILOBE®	Bimetallic, high particle density	Naphtha	Gaso. or BTX	Sh. ext.	45	"	"	✓
CK-542 TRILOBE	High-Re high particle density, shaped catalyst	Low S-Naphtha	"	"	"	"	"	✓

(Continued)

Abbreviations for catalyst compilation

ABD -- Apparent bulk density
AGO -- Atmospheric gas oil
Aro -- Aromatics
HC -- Hydrocracking or hydrocracked
Cet. -- Cetane
Cyl. -- Cylinder
DAO -- Deasphalted oil
Dist. -- Distillate
DO -- Diesel oil
Ext. -- Extrudate
HAGO -- Heavy atmospheric gas oil
HDM -- Hydrodemetallization
HDN -- Hydrodenitrogenation
HDS -- Hydrodesulfurization
HDT -- Hydrotreating or hydrotreated
HFO -- Heavy fuel oil
HGO -- Heavy gas oil
HVGO -- Heavy vacuum gas oil
Jet -- Jet fuel
Kero. -- Kerosine
LCO -- Light cycle oil
LGO -- Light gas oil
LSFO -- Low sulfur fuel oil
LSR -- Light straight-run
MS -- Microsphere
Oct. -- Octane
'P' -- Proprietary
RE -- Rare earth
RDS -- Resid desulfurization
SA -- Surface area
Sph. -- Sphere
Sh. ext -- Shaped extrudate
VGO -- Vacuum gas oil
ZEO. -- Zeolite

Catalytic naphtha reforming—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
PHRF-30	Multimetallic	Naphtha	Gaso. or BTX	Cyl.	"P"	"	"P"	L
CK-473	High-Re catalyst	Naphtha	Gaso. or BTX	Cyl.	44	"	Pt/ReCl	✓
KX-120, KX-130, KX-160	See Exxon Research & Engineering							L
ENGELHARD CORP.								
KX-120	(See Exxon Research Engineering cat. naphtha reforming)							
E-301	Moderate stability	Naphthas, S < 5 ppm wt	Gaso. or Aro.	Cyl.	45	Al_2O_3	Pt	✓
E-302	More stable than E-301	Naphthas, S < 10 ppm wt	Gaso. or Aro.	Cyl.	45	"	"	✓
E-311	Maximize LPG production	Naphthas, S < 5 ppm wt	LPG gaso.	Cyl.	45	"	"	✓
E-601	High stability	Naphthas, S < 1 ppm wt	Gaso. or Aro.	Cyl.	45	"	Rt, Re	✓
E-603	High stability. Lower metal loading than E-601.	Naphthas, S < 1 ppm wt	Gaso. or Aro.	Cyl.	45	"	"	✓
E-611	Very high stability	Naphthas S = 0.1 ppm wt	Gaso. or Aro.	Cyl.	45	Al_2O_3	Pt/Re	✓
(Note: Preceeding catalysts available in higher density at 49.5 lb/cu ft. They are designated HD, for example E – 301 HD).								
E-801	Stability of E-603 at higher activity	Napathas S <1 ppm wt	Motor fuel or aromatics	"	51	"	"	✓
E-802	Stability of E-611 at higher activity	Naphthas, S ≤ 0.5 ppm wt	"	"	51	"	"	✓
E-803	Stability of E-611 at higher activity, optimized metals loading	"	"	"	51	"	"	✓
E-804	Stability & activity of E-801, optimized metals loading.	"	"	"	51	"	"	✓
EXXON RESEARCH & ENGINEERING CO.								
KX-120	Multimetallic semiregen. or cyclic units; different promotor	Virgin/cracked naphthas	High oct. gaso & aro.	—	—	—	Pt, etc.	L
KX-130	", different promotor	"	"	—	—	—	—	L
KX-160	", different promotor	"	"	—	—	—	—	L
INSTITUTO MEXICANO DEL PETROLEO								
IMP-RNA-1	High activity bimetallic	Desulfurized naphtha, aromatics production	BTX aro. high oct. gas	Cyl.	0.70*	Al_2O_3	Pt/Re	L
IMP-RNA-2 TRILOBE®	"	Desulfurized naphtha, aromatic production	BTX aro. high octane gas.	Exts.	0.70*	Al_2O_3	Pt/Re	L
KATALYSATORENWERKE HÜLS GmbH								
H 2440		Fraction 35-195 °C.	Gaso., BTX	Cyl. exts.	0.8*	Al_2O_3	Pt, 0.3-0.8% monometallic	✓
H 6413		"	"	"	0.6*	"	"	✓
H 2462		"	"	"	0.6*	"	Pt, 0.3-0,8% + "P"	✓
PROCATALYSE								
RG 412	H.P. reformer	Naphtha	Gaso.	Cyl.		"	Pt 0.35%	✓
RG 432	M.P. reformer	Naphtha	Gaso.	Cyl.		"	Pt 0.35% + Ir	✓
RG 482	M.P. & L.P. reformer	Naphtha	Gaso.	Cyl.		"	Pt 0.3% + Re	✓
RG 492	M.P. & L.P. reformer	Naphtha	Gaso.	Cyl.		"	Pt/Re	✓
RG 442	Reformer	Naphtha	Gaso. & LPG	cyl.	"	Pt + Ir + promotor		
CR 201	Cont. regen. reformer	Naphtha	Gaso.	Sph.		"	Pt Sn	✓
AR 401	Cont. regen. reformer (Aromizing-IFP)	Naphtha	Aro.	Sph.		"	Pt/promotor	L
AR403	Cont. regen. reformer (Aromizing IFP)	Naphtha	Aro.	Sph.		"	Pt/Promotor	L
UOP INC.								
R-11†	Higher activity monometallic	Semi-regen. or swing	Gaso. aro.	Sph.	32	Al_2O_3	Pt	Contact UOP
R-12†	Monometallic, higher stability than R-11	Semi-regen.	Gaso., aro.	Sph.	32	"	Pt	"
R-55†	Monometallic, higher activity and stability than R-12,	Semi-regen. or swing	Gaso. aro.	Ext.	Dense-loaded 52	Al_2O_3	Pt	Contact UOP
R-15†	Monometallic	Semi-regen.	LPG, gaso.	Sph.	32	SiO_2/Al_2O_3	Pt	"
R-16H†	Bimetallic, higher stability than monometallics	High severity, semi-regen.	Gaso. aro.	Sph.	32	Al_2O_3	Pt/Re	"
R-16F†	Bimetallic, low Pt, higher stability than monometallics, reduced and sulfided	High severity, semi-regen.	Gaso. aro.	Sph.	32	"	Pt/Re	"
R16G†	Bimetallic, higher activity and stability than R-16F and H,	High severity, semi-regen.	Gaso. aro.	Sph.	32	"	Pt/Re	"
R-18†	Bimetallic, higher activity and stability than R-16 series,	High severity, semi-regen.	Gaso. aro.	Sph.	37	"	Pt/Re	Contact UOP

(Continued)

Catalytic naphtha reforming—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
R-22	Bimetallic, higher yields, reduced state	CCR or semi, regen.	Higher production of oct. bbl & aro.	Sph.	32	"	"P"	"
R-30	Bimetallic, higher yields and activity reduced state.	CCR or swing reactor	"	Sph.	35	"	"P"	"
R-32	Bimetallic, higher yields and activity reduced state	CCR	"	Sph.	35	"	"P"	"
R-50†	Bimetallic, higher activity and stability than R-16 series,	High severity, semi-regen.	Gaso. aro.	Ext.	Dense loaded 52	"	Pt/Re	"
R-51	"	"	"	"	43	"	Pt/Re	"
R-60†	Bimetallic, higher stability than R-50, high activity	High severity, semi-regen.	Gaso. aro.	Sph.	45	"	Pt/Re	"
R-62	Bimetallic, Lower Pt than R-60, higher stability than R-50, high activity	High severity, semi-regen.	Gaso., aro.	Sph.	44	"	Pt/Re	"

†Reduced and sulfided.

Dimerization catalysts

KALI-CHEMIE AG Beadcat PK Series	Mechanical and thermal stability	C_3/C_4 olefins	Gaso.	Bead	0.80*	SiO_2/Al_2O_3	Acid sites Al_2O_3	✓
PROCATALYSE LC 1252		Propylene/butylene	Gaso./hexenes/octenes	Liquid	—	—	Ni	L

Isomerization C_4 catalysts

BP								
BP Isom	High activity, regenerable			Cyl.		Al_2O_3	Pt Cl	L
UOP INC.								
I-8	Higher activity for n-butane isom to iso-butane			Ext.	48	Al_2O_3	Pt	Contact UOP
ENGELHARD CORP.								
RD-290C	Regenerable, high activity			Cyl.	48	Al_2O_3	Pt cl	L

Isomerization (C_5 & C_6) catalysts

BP								
BP Isom	High activity, L.P. operation, regenerable	C_5, C_6 fractions		Cyl.	-	Al_2O_3	Pt Cl	L
ENGELHARD CORP.								
RD-290C	Regenerable, high activity	C_5, C_6 paraffins		Cyl.	48	Al_2O_3	PtCl	L
PROCATALYSE IS632	Non-chlorinated, high activity	C_5/C_6 paraffins	High oct. gaso. or isomers	Ext.	0.50*	Special	Pt	✓
UNION CARBIDE CORP.								
HS-10 HS-12	Non-chloride activated, high tolerance for feed impurities	C_5/C_6 Isom.	Octane upgrade	Cyl.	46	Mole sieve Al_2O_3	Pt	L
UOP INC.								
I-7	High activity, sulfur and water tolerant	SR or HDT C_5/C_6 streams		Ext.	36	"P"	Pt	Contact UOP
I-8	High activity, L.P. application	"		Cyl.	48	Al_2O_3	Pt	"

Isomerization (xylenes) catalysts

ENGELHARD CORP.								
0-750®	Xylene isom.	C_8 aromatics	P, o-xylene	Cyl.	"P"	"P"	Pt	L
KALI-CHEMIE AG Beadcat PK series	Xylenes isom.	xylenes	p, o-xylene	Bead	0.80*	SiO_2/Al_2O_3	Acid sites	✓
UOP INC. I-9	High activity & high selectivity.	Mixed xylenes, ethylbenzene	p, o-xylene	Sph.	37	"P"	"P"	Contact UOP

Fluid catalytic cracking

AKZO CHEMIE/AKZO CHEMIE AMERICA/KETJEN CATALYSTS								
Ketjen Lowcoke® 80/800 series KLC-80/800	Low delta coke, Low regn. temp., Gaso. selective	FCC feed, Lt. resid	Gaso., mid dist., alky. feed	MS	0.78*-0.82*		Low RE zeo.	✓
Ketjen Lowcoke® 80-800 series KLC-80/800+	Extra low Δ coke, high oct. & oct. bbl	VGO Lt. resid	Gaso.-mid-dist	"	0.76*-0.82*		Stab. low RE Zeo.	✓

(Continued)

Fluid catalytic cracking—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
Ketjen Multicrack® 20/200 Series KMC-20/200	Low coke, gas make, int. oct. gaso. selective	VGO, resid	Gaso., oct. LCO, cet.	"	0.76*-0.80*	Active matrix	Low RE zeo.	✓
Ketjen Multicrack® 50/500 series KMC-50/500	Max. bot. conv., int. oct., Gaso. selective	VGO, resid, HDT feeds	"	"	0.74*-0.78*	"	Low RE Zeo.	✓
Ketjen Multicrack® 20/200+ Series KMC-20+/200+	High oct. & oct. bbl, low coke, gas make	VGO, resid	"	"	0.75*-0.79*	"	Stab. Low RE Zeo.	
Ketjen Multicrack® 50/500+ series KMC-50+/500+	High Oct. & oct. bbl, max. bott. upgrade	VGO, resid, HDT feeds	"	"	0.72*-0.78*	"	Stab. Low RE Zeo.	✓
Octaboost® 600 series KOB-600	High oct., low coke, gas, Bott. upgrade	VGO, resid	Alky feed, gaso. oct, LCO, cet.	"	0.72*-0.80*	"	USY	✓
Octaboost® 610 Series KOB-610	Low soda, attrition resist., High oct., bott. upgrade	"	"	"	0.72*-0.80*	"	USY	✓
Octaboost® 620 Series KOB-620	High oct. & oct. bbl, bott. upgrade	"	"	"	0.72*-0.80*	"	USY	✓
Octaboost® 600/610 Low coke series KOBN-600/610 LC	Max. oct., extra low Δ coke	"	"	"	0.72*-0.80*		USY	✓
Ketjen Metal Resist® 900 Series KMR-900	Metal resist., bottom conv., low Δ coke	High metals, hvy. resid	Gaso.; oct., LCO	"	0.75*-0.82*	V+Ni trap	Low RE Zeo.	✓
Ketjen Metal Resist® 920 Series KMR-920	Metals resist, bott. conv., low Δ Ni sensitivity	VGO, resid	Gaso., oct., Diesel	"	0.75*-0.80*	Selective active matrix	Stab. low RE Zeo.	✓
Ketjen Metal Resist® Additive MR	Metals resist.	High metals feed	Gaso., oct, LCO	Incorporated into any ketjen FCC catalyst		Vi + Ni trap		✓
CATALYSTS & CHEMICALS INDUSTRIES CO., LTD.								
MRZ-210	Low activity, high liquid yield	FCC feed	Gaso. & LCO	MS	0.74*	SiO_2/Al_2O_3	Zeo.	✓
MRZ-220	High liquid yield	"	"	"	"	"	"	✓
MRZ-230	"	"	"	"	"	"	"	✓
MRZ-203	High octane metals tolerance	FCC feed	Gaso.	MS	0.74*	SiO_2/Al_2O_3	Zeo.	✓
MRZ-204	"	"	"	"	"	"	"	✓
MRZ-206	"	"	"	"	0.72*	"	"	✓
MRZ-203S	High oct. metal tolerance, high hydrothermal stability	FCC feed, high metals feed	Gaso.	MS	0.74*	"	"	
MRZ-204S	"	"	"	"	"	"	"	✓
MRZ-206S	"	"	"	"	0.70*	"	"	✓
MRZ-208	High gasol. yield & oct.	FCC feed	Gaso.	MS	0.68*	"	"	✓
MZR-208S	"	"	"	"	"	"	"	✓
MRZ-230	High gaso. yield, high metal feed tolerance	FCC feed, high metals feed	Gaso.	MS	0.74*	SiO_2/Al_2O_3	Zeo.	✓
MRZ-240			"	"	0.74*	"	"	✓
MRZ-260			"	"	0.70*	"	"	✓
Hylic-30	High liquid	FCC feed	"	"	0.80*	"	"	✓
-40	"	"	"	"	"	"	"	✓
Hycon-20	Hy oct. and metals tolerance	FCC feed	Gaso.	"	0.78*	SiO_2/Al_2O_3	Zeo.	✓
-30		"	"	"	"	"	"	✓
-40	"	"	"	"	"	"	"	✓
Valec-50	"	"	"	"	0.70*	"	"	✓
-60	"	"	"	"	0.68*	"	"	✓
-70	"	"	"	"	0.65*	"	"	✓
RCZ-540	High oct., low coke, high metal tolerance	FCC feed	Gaso.	MS	0.75*	SiO_2/Al_2O_3	Zeo.	✓
RCZ-550	"	"	"	"	"	"	"	✓
RCZ-560	"	"	"	"	"	"	"	✓
Octup	Oct. additive	FCC feed	Gaso.	MS	0.70*	SiO_2/Al_2O_3	ZSM-5	✓
CROSFIELD CATALYSTS								
XL Series	Bottoms crack, and high gaso. and oct. selectivity	Gas oils	Bottoms upgrade, high liquid product. oct. and cet.	MS		SiO_2/Al_2O_3	Zeo. matrix	✓
XL 60	"	"	Low activity	"	0.87*	"	"	✓
XL 80	"	"	Medium activity	"	0.86*	"	"	
XL 100	"	"	High activity	"	0.84*	"	"	✓
SLS Extra Series	High oct. gaso. liquid product	Gas oils, resids	Gaso, LCO,	MS		SiO_2/Al_2O_3	Zeo. matrix	✓
SLS 60 Extra			Low activity	MS	0.75*	SiO_2/Al_2O_3		✓
SLS 80 Extra			Med. activity	MS	0.74*	"	"	✓
SLS 100 Extra			High activity	MS	0.72	"	"	✓
SLS Series	Coke selectivity, gaso. mid. dist. oct., max. oct bbl	Gas oils and resids	Max. gaso. oct. bbl, selective bottom cracking	MS		SiO_2/Al_2O_3	Zeo. matrix	✓
SLS-60	"	"	"	"	0.78* ABD	"	"	✓
SLS-80	"	"	"	"	0.76*	"	"	✓
SLS-100	"	"	"	"	0.76*	"	"	✓

(Continued)

Fluid catalytic cracking—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
GLS Series	Max. gaso liq. product, low coke, gas select	Gas oils, resids	Gaso. LCO, act.	MS "		SiO_2/Al_2O_3 "	Zen. CMT	✓ ✓
GLS 60	"	"	Low activity	"	0.75*	"	"	✓
GLS 80	"	"	Med. activity	"	0.74*	"	"	✓
GLS 100	"	"	High activity	"	0.72*	"	"	✓
Quantum M Series	Max. oct.,	Gas oils,	Oct., oct. bbls	MS		SiO_2/Al_2O_3	Zeo.	✓
Quantum 80 M	Oct. bbl, low	resids	Med. activity	"	0.72*	"	CMT	✓
Quantum 100 M	Coke, gas select	"	Low activity	"	0.70*	"	"	✓
Vanadium trap (VT), FLuidization additive (CFA), and combustion promoter (CP) can be added to all catalysts								
DAVISON CHEMICAL DIVISION, W. R. GRACE & CO. (Each catalyst group arranged in decreasing order of activity)								
CBZ-1	General purpose, increased LCO yield	Gas oil, mild resid	Gaso. & dist.	MS	0.52* ABD	"P"	Zeo. matrix	✓
CBZ-4		"	"	"	0.58*	"P"	"	✓
DA-440	Max. unit retention, high stability, bot. cracking	Gas oil, resid	Gaso. & dist.	MS	0.82* ABD	"P"	Zeo. matrix	✓
DA-400	"	"	"	"	0.83*	"	"	✓
DA-300	"	"	"	"	0.82*	"	"	✓
DA-250	"	"	"	"	0.85*	"	"	✓
DA-200	"	"	"	"	0.85*	"	"	✓
DZ-8	General purpose, bot. cracking, low ABD	Gas oil, mild resid	Gaso. & dist.	MS	0.52* ABD	"P"	Zeo. matrix	✓
GX-30	Bot. cracking, nitrogen, metals tolerance	Gas oil, resid, coker gas oil high N-feeds	Gaso. & dist.	MS	0.74* ABD	"P"	Zeo. matrix	✓
GX-20	"	"	"	"	0.76*	"	"	✓
GX-10	"	"	"	"	0.78*	"	"	✓
GXO-41	Oct. enhancement, bot. coker cracking, coke selectivity, stability	Gas oil, resid, gas oils, high N-feed	Gaso. & dist.	MS	0.78* ABD	"P"	Zeo. matrix	✓
GXO-40	"	"	"	"	0.75*	"	"	✓
GXO-27	"	"	"	"	0.77*	"	"	✓
GXO-28*	Max. stability, oct., coke selectivity, bot. upgrade, metals tolerance	Gas oil, resid, coker gas oils, high N-feed	Gas. & dist.	MS	0.78* ABD	"P"	Z-14US zeo.	✓
GXO-25+	"	"	"	"	0.77*	"	"	✓
GXO-25	"	"	"	"	0.77*	"	"	✓
GXO-31+	"	"	"	"	0.72*	"	"	✓
GXO-31	"	"	"	"	0.72*	"	"	✓
GXO-25S	"	"	"	"	0.76*	"	"	✓
*Catalysts arranged in decreasing order of activity								
Super Nova D†	Coke selectivity, oct. stability max. unit retention, bott. cracking	Gas oil, resid, coker gas oils, high N-feeds	Gaso. & dist.	MS	0.75* ABD	"P"	Z-14US zeo.	✓
Super Nova D	"	"	"	"	0.75*	"	"	✓
Nova D	"	"	"	"	0.83*	"	"	✓
Nova D-2	"	"	"	"	0.81*	"	"	✓
Nova-SX*	Coke, gas selectivity mod. cost	Gas oil, resid	Gaso. & dist.	MS	0.78* ABD	"P"	Zeo.	✓
Nova-S	"	"	"	"	0.78*	"	"	✓
Octacat+*	Max. oct. stability, min. coke	Gas oil, resid, coker gas oils	Gaso. & dist.	MS	0.70* ABD	"P"	Z-14US zeo.	✓
Octacat	Maximum octane enhancement and stability, minimum coke make	Gas oil, resid, coker gas oils	Gaso. & dist.	"	0.70* ABD (ABD)	"P"	Z-14US zeo.	✓
Octacat-2	"	"	"	"	0.73*	"	"	✓
Octacat-3	"	"	"	"	0.76*	"	"	✓
Octacat B	Max. oct., stability, bott. cracking	"	"	"	0.70*	"	"	✓
Octacat-D*	Max. retention, with improved bott. cracking	Gas oil, resid, coker gas oils, high N-feeds	Gaso. & dist.	MS	0.75* ABD	"P"	Z-14US zeo.	✓
Octacat-D2	"	"	"	"	0.76*	"	"	✓
Octacat-D3	"	"	"	"	0.78*	"	"	✓
RC-25	High liquid product selectivity, isobutane yield, metal tolerance	Gas oil, resid	Gaso., dist.	MS	0.73* ABD (ABD)	"P"	Zeo. matrix	✓
Super-D Magnum	"	"	"	"	0.73*	"	"	✓
Super-D Extra	"	"	"	"	0.77*	"	"	✓
Super-D	"	"	"	"	0.79*	"	"	✓
Super-D2	"	"	"	"	0.80*	"	"	✓
Super-D3	"	"	"	"	0.80*	"	"	✓
Super-D4	"	"	"	"	0.81*	"	"	✓
Gencat	High activity, mod. cost flush, coke & gas make selectivity	Gas oil, resid	Gaso. & dist.	MS	0.80*	"P"	Zeo.	✓
XP-60	Bott. cracking, oct., coke selectivity, retention.	Gas oil, resid	Max. bott. reduction	MS	0.80*	"P"	Z-14 US matrix	✓
XP-45	"	"	"	"	0.80*	"	"	✓

(Continued)

Fluid catalytic cracking—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
HP-75+	Bott. cracking, oct., coke selectivity, retention	Gas oil, resid	Max. bott. reduction	MS	0.80*	"P"	Z-14 US zeo. matrix	✓
XP-75	"	"	"	"	0.80*	"	"	✓
CP-3	Combustion promotion		Additive	MS	0.85* ABD	"P"	"P"	✓
CP-5	High activity, stability		"	MS	"P"	"P"		✓
Additive O	Gaso. oct.		Additive	MS	0.80* ABD	"P"	"P"	✓
DVT	Vanadium passivation		Additive	MS	0.65* ABD	"P"	"P"	✓
Additive R	SO_x		Additive	MS	0.98* "	"P"	"P"	✓
ENGELHARD CORP.								
ULTRASIV®-280 ULTRASIV®-260 ULTRASIV®-250 ULTRASIV®-240 ULTRASIV®-230 ULTRASIV®-220	US-280 highest activity, vandidium tolerance, low gas, attrition resist.	Gas oils, gas oil-resid mixtures, resid	Incremental resid processing	MS	1.1*	In situ SiO_2/Al_2O_3	Zeo. mod. RE, mod. SA	✓
HEZ-55™ EPZ®-55 HEZ-54™ HEZ-53™ HEZ-52™ HEZ-50™	HEZ-55 highest activity, EPZ designates O promoted designates CO promoted	Gas oils, high N-gas oils, Calif. gas oils	Bot. upgrade oct. bbl, cet.	MS	1.0*	"	Zeo., moder., RE high SA	✓
MAGNASIV®-380 MAGNASIV®-370 MAGNASIV®-360	MAG-380 highest activity, low coke, gas make, metal tolerance, hydrothermal stability, bott. upgrade	Gas oils, high N-gas oils. Calif. gas	Max. liquid yield	MS	1.05*	"	Zeo., RE mod. SA,	✓
Octasiv Plus® 680, 670 660	680 highest activity, stability metals tolerance, hydro thermal stab., bott. upgrade	Gas oils, gas oil-resid, resid	Max. oct. bbl	MS	1.0*	"	Ultrastable zeo., low RE, low matrix SA	✓
Octasiv Plus® 580, 570, 560	580 highest activity, stability, metals tolerance, hydrothermal stab.	Gas oils, gas oil resid, resid	Max. olefin production	MS	1.0*	in situ SiO_2/Al_2O_3	Ultrastable zeo., mod. matrix SA	✓
Octasiv Plus® 160, 150, 140	160 highest activity, oct. adv. over REO	Gas oils, gas oil resid, resid	Bott. upgrading, and metals tolerance.	MS	1.0*	In situ SiO_2/Al_2O_3	Ultrastable zeo., low RE mod. matrix SA	✓
ULTRASOX®	Available in a variety of cracking & sulfur reduction activities	High gas oils, gas oil-resid mix	SOx reduction	MS	1.1*	In situ SiO_2/Al_2O_3	Zeo./Prop. SOx reduction	✓
HFZ®-33 HFZ®-20 HFZ®-23 HFZ®-25	HFZ-33 highest activity	Gas oils	Olefins for chemical feed, high oct. cat.	MS	1.0*	In situ / SiO_2/Al_2O_3	Zeo. No RE, High SA	✓
Ultradyne® 980/ 980, 970, 960 950, 940, 930	UD980 is highest activity low matrix SA	Gas oil	Low coke production, low gaso. bromine number, high gaso. yield, low dry gas yield	MS	1.0*	In situ Sio_2/ Al_2O alumina	Zeolite	✓
Ultradyne® Plus 1580, 1560, 1550, 1540, 153	UDP 1580 highest activity. low matrix SA oct. cat.	Gas oil, resid	Oct. bbl, low coke, dry gas	MS	1.0*	"	Ultrastable zeo. low RE, low matrix SA	✓
Dynacat® 1080, 1070, 1060, 1050, 1040, 1030	DC 1080 highest activity vanadium tolerant metal	Resid, high metals gas oil	High activity maintenance under contaminated situations	MS	"	"	"	✓
Dynasiv® 780, 770, 760, 750 740, 730	DS 780 is highest activity	Gas oil, mild resid	Mod. oct. bott. upgrade, high gaso. selectivity	"	"	"	"	✓
Dynasiv Plus® 880, 870, 860 850, 840, 830	DSP880 is highest activity	Gas oil/ resid	Oct. gaso. selectivity, bott. upgrade	"	"	"	Ultrastabilized zeo.	✓

(Continued)

Fluid catalytic cracking—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
Octidyne® 1170, 1160, 1150, 1140, 1130	OP1170 is highest activity, RON, MON imp., low coke	Gas oil/ resid	Max. oct. max. gaso. selectivity, reduced regen. temp	*	*	*	*	✓
DynaSox® 1380, 1340, 1370, 1360, 1350, 1330	DSX 1380 is highest activity	Gas oil/ resid	Mod. SOx reduction built in Gaso. selectivity selection and bott. upgrade	*	*	*	Zeo.	✓
Nitrodyne® 1490 1480,1470	ND1490 extremely high activity	High N feed, coker gas oils	High in-unit activity, converversion bot. upgrade	MS	1.0*	SiO_2/Al_2O_3	Zeo.	✓
Z-100®		Gas oil, resid	RON, MON, Imp., definicity	MS	1.0*	SiO_2/Al_2O_3	XSM-5	✓
HARSHAW/FILTROL								
F/X-450, 460 470, 480	480 highest act. oct. cat	Gas oils through resid	Max. oct., min. coke, bot. upgrade	MS	0.80*	Active Al_2O_3	Low RE, low sodium, dealum (DY) Zeo., active stable crystalline alumina matrice	✓
FSS-1 DY 2 DY 3 DY	Very stable, all purpose. "3" highest activity	Gas oils, resids, high N-feed	High gaso. yields, bott. upgrading, severe operations	MS	0.80*	Active Al_2O_3	High RE, Dy zeo. low soda, active stable crystalline alumina matrix	✓
HRO-550 560 570 580	580 highest act. Max. oct. bbl	Gas oil through resid	Oct. appr. F/X, stab. appr. FSS-DY	MS	0.80*	Active Al_2O_3	*	✓
(TEX-)1 DY -2 DY -3 DY	Stable high oct. gaso. "3" highest activity	Gas oils or resid	High gaso. yields & O.N. low coke, high LCO cet. grading	MS	0.80*	Active Al_2O_3	Moderate RE DY zeo. active stable crystalline alumina matrix.	✓
ROC-1DY 2DY	Resists metals, Low coke make. Highest activity, 2DY	Heavy gas oil, high metals resids.	*	MS	0.80*	Active Al_2O_3	Mod. to high RE DY zeo. active stable crystaline alumina matrix	✓
SOC-1 DY 2 DY	Very stable, low coke make high activity. "2" highest activity	HGO, high metals resids.	High gaso. yield & O.N., low coke, high LCO, cet. bott. upgrading, severe operations	MS	0.80*	Active Al_2O_3	Low to mod. RE, DY, zeo., low soda, active crystalline alumina matrix	✓
FLEX-230 -440 -650 -860	860 highest act., gen. purpose	Gas oils through resid	Max. gaso. select. min. gas make,or units not requiring max. stab.	MS	0.80*	Active Al_2O_3	High RE, DY Zeo., active stable crystalline alumina matrix	
EXSEL-620 -630 -640	640 highest act., gen purpose	Gas oil, high met resid. (blend cat.)	High gaso. select. bott. upgrade gas, metals control	MS	0.80*	Active Al_2O_3	Low RE, DY Zeo. active stable crystalline alumina matrix	
DOC-1 DY -2 DY	Diesel oil production	Gas oils resids.	Max. LCO yield, high cet. bott. upgrading	*	*	*	Low RE DY zeo. active crystalline alumina matrix	✓
FOCUS-1 -2	High oct. gaso., low gas and coke make.	Gas oils through resids.	Highest ON gaso., low coke, gas, make, bott. upgrade	MS	0.80* (ABD)	*	*	✓
S grade	Reduced matrix act.	Gas oils	Red. activity of any filtrol FCC cat.	MS	0.80*	*	Active stable crystalline alumnina. matrix.	✓
BCA	Bott. crack additive	High met. resid	Bott. crack., metals flush	MS	0.80*	*	"P"	✓
Intercat Corp								
Z-cat	Octane additive	FCC feeds	High oct. gaso.	MS	50	"P"	ZSM-5	✓

Fluid catalytic cracking—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
KATALISTIKS INTERNATIONAL INC.								
Alpha-540	High activity oct.	Gas oils, resids, reduced crudes	Max. oct. bbl, high selectivities	MS	SiO_2/Al_2O_3		LZ-210, active matrix	✓
Alpha-640	″	″	″	″		″	″	
Beta-540	Octane	Gas oils, resids, reduced crudes	Max. octane	MS	SiO_2/Al_2O_3		LZ-210, active matrix	✓
Beta-640	″	″	″	″	″	″	″	
Beta-600	Highest octane	Gas oils, resids, reduced crudes	Max. octane	MS	SiO_2/Al_2O_3		LZ-210, active matrix	✓
Delta-400	Max. RON, MON without yield penalty	Gas oil, resid, reduced crude	High liquid, max. mid-bbl yield. Low 650+ yield.	MS	0.74* ABD	SiO_2/Al_2O_3	USY Zeo., & low SA matrix matrix	✓
Delta -444	High RON, MON, increased gasoline	″ ″	High gaso. yields with high oct.	MS ″		SiO_2/Al_2O_3 ″	USY Zeo., RE & active matrix	✓
Delta-454	″	″	″	″	″	″	″	✓
Delta-455	″	″	″	″	″	″	″	✓
Delta-464	″	″	″	″	″	″	″	✓
Gamma-419	High RON, MON, OCt. bbl, high stability, coke selectivity selectivity	Gas oil, resid, reduced crude	High Liquid mid bbl yields, low gas, coke, 630+ yields	MS	0.74*	SiO_2/Al_2O_3 Al_2O_3	High SiO_2 zeo. matrix matrix	✓
Gamma-419+	″	″	″	″-	″	″	″ + low RE	✓
Gamma-450	″	″	″	″	″	″	″	✓
Gamma-550	″	″	″	″	0.73*	″	″	✓
Gamma-620	″	″	″	″	0.72*	″	″	✓
Sigma-200 Plus	High oct. bbl, good good coke, gas selectivity. 5 activity levels for dist. gas. operations	Gas oils, resids, reduced crudes	High liquid, max. mid-bbl yield, low coke gas make.	MS	0.76* ABD	SiO_2/Al_2O_3	High silica, low RE zeo. matrix	✓
Sigma-300 Plus	″	″	″	″	0.75*	″	″	✓
Sigma-400 Plus	″	″	″	″	0.74*	″	″	✓
Sigma-500 Plus	″	″	″	″	″	″	″	✓
Sigma-600 Plus	″	″	″	″	0.72*	″	″	✓
Sigma-200	General purpose, high stability, 4 activity levels.	Gas oil, resid, reduced crude high N, coker and gas oil	High liquid max. mid-bbl yield. low 650 + yield, low gas, attrition resistance, low bromine number, balanced butane. yields.	MS	0.74 ABD	SiO_2/Al_2O_3	Mixed zeo. low SA matrix	✓
Sigma-300	″			″	0.75* ″	″		✓
Sigma-400	″	″		″	0.74* ″	″	″	✓
Sigma-600	″	″	″	″	0.72*	″	″	✓
EKZ-2	General purpose, 3 activity levels	Gas, dirty feeds, coker gas oils	High liquid yield, low gas, coke	MS	0.79* ABD	SiO_2/Al_2O_3	Fully ReO exchanged zeo.	✓
EKZ-3	″	″	″	″	0.78*	″	″	✓
EKZ-4	″	″	″	″	0.76*	″	″	✓
BMZ-200	Max. dist. or max gas.	Gas oil, resid, reduced crude, high N coker gas oil	High liquid, max. mid-bbl yield. Low 650+ yield, low gas, attrition resistance. low bromine number, high isobutane yield.	MS	0.76* ABD	SiO_2/Al_2O_3	High silica, fully RE, zeo. SA matrix	✓ ✓ ✓ ✓
BMZ-300	″	″		″	0.75*	″	″	✓
BMZ-400	″	″		″	0.74*	″	″	✓
BMZ-600	″	″		″	0.72*	″	″	✓
Ekonokat-1	General purpose, 2 activity levels.	Gas oils, dirty feeds, coker gas oils	High liquid yield, low gas, coke low 650+ yield.	MS	0.76* ABD	SiO_2/Al_2O_3	Mixed zeo., low SA matrix	✓
Ekonokat-2	″	″	″	″	0.72* ABD	″	″	✓
W. R. GRACE CATALYSTS PTY. LTD. (see complete listing of Davison Chemical Division, W.R. Grace & Co.)								

Hydrocracking

AKZO CHEMIE/AKZO CHEMIE AMERICA/KETJEN CATALYSTS/NIPPON KETJEN (All of Ketjenfine catalyst available as existing presulfided)								
Ketjenfine, LC-fining	(See Lummus Crest HC listing)	Resid HC		Cyl.		"P"	Co Mo	L
Ketjenfine H-oil, (HRI Texaco)		Resid HC		Cyl.		"P"	CoMo & NiMo	L
Ketjenfine HC-143	(See BP HC listing)	VGO HC		Cyl.		"P"	"P"	L
KC-2000	NiMo		Gaso.	Cyl.		"P"	"P"	
KC-2100	Precious metal		″	″		″	″	
KC-2200	NiW		Mid-dist.	″		″	″	
AMERICAN CYANAMID CO.								
IPB-2		AGO, VGO	Gaso. & dist	Cyl.		"P"	"P"	L
HC-102	(See Unocal HC listing)							L

(Continued)

Hydrocracking—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
MD-2	(See BP HC Listing)							L
HDS-1442B	Ebullating bed	Resid HDT		Cyl.	34	Al_2O_3 MoO_3	CoO/	L
HDS-1443B	"	"		"	36	"	NiO/MoO$_3$	L
GC-30-36	(See Chevron Research HC listing)							L
ARCO TECHNOLOGIES INC.								
ARCO H-H Cat		Raw lube stock	High quality lube products	Cyl.	48			L
BP								
MD-2		VGO	Mid. Dist.	Cyl.		"P"	"P"	L
BASF AG								
M 8-80	Raffination, HC	HGO,VGO	Mid. dist. steam-cracker feed	Cyl.	0.70*	Amorph. alumina-silicates	NiO MoO_3	L
M 8-81	HC	"	"	"	0.68*	"	"	✓
CHEVRON RESEARCH CO.								
ICR 106	High HDN, high cracking activity,	VGO, CGO, LCO, AGO	Diesel, jet, naphtha, Isocracker 2nd stage feed	Cyl.	55-63	"P"	"P"	L
ICR 120	Max. diesel yield	"	"	Cyl.	50-58	"P"	"P"	L
ICR 126	Longer life	"	"	Cyl.	55-63	"P"	"P"	L
ICR 113	Lower cost	" DAO	"	Cyl.	45-53	"P"	"P"	L
ICR 117	Naphtha yield	VGO, CGO, LCO, AGO	Naphtha, jet, diesel, isocracker 2nd stage feed	Cyl.	50-58	"P"	"P"	L
ICR 202	High activity, selectivity	Hydrofined VGO, CGO, LCO	Reformer feed, lt naphtha, jet fuel, isobutane	Cyl.	53-61	"P"	"P"	L
ICR 204	Long cycle life	"	"	Cyl.	44-52	"P"	"P"	L
GC-36	Max. gaso. HC	Dist. lt gas oils	Gaso., naphtha kero. jet	Cyl.	50-60	SiO_2/Al_2O_3	"P"	✓
GC-30	Max. dist.HC	Dist. H, H, Hvy. VGO	Furnace oil, diesel, jet, kero.	Cyl.	50-60	SiO_2/Al_2O	"P"	L
KATALCO DIVISION, ICI AMERICAS								
KAT-4000	Active metal	Atm. & Vac. resid		Cyl.	34	Al_2O_3	CoMo	✓
KAT-5000	Active metal	Amt. & vac. resid		Cyl.	34	"	Ni Mo	✓
LUMMUS CREST INC.								
LC-Fining	Heavy feed, metals tolerance	Atm. bott., vac. bott. hvy crudes, tars, etc.	Dist., low S fuel	Cyl.	Low	Al_2O_3	CoMo/NiMo	L
PROCATALYSE								
HYC 642	High cracking activity	Gas oil, VGO	Gaso. dist	Ext.		Special	NiMo	✓
SHELL CHEMICAL								
S 324	HDN & 1 stage HC	Coal oil HC,		Cyl.	0.86*	Al_2O_3	Ni Mo	✓
S 324T	"	"		Sh. ext.	0.80*		"	✓
S 424	HDN, 1 stage HC	1 stage HC		Sh. ext.	0.82*	Al_2O_3	NiMo	✓
S 411				"	0.85*			
S 653	2nd stage HC	VGO to naphtha, middle dist.		Ext.	0.85*	SiO_2/Al_2O_3	NiW	✓
S-753	"	"		"	0.70*	Crystalline SiO_2/Al_2O_3		L
S 354	Heavy dist., HC			Ext.	1.02*	Al_2O_3	NiW	✓
S 454	"			Ext.	1.05*	Al_2O_3	NiW	✓
UOP INC.								
DHC-2	Bifunctional, strong hydrogenation good cracking activity	VGO, DAO, CGO other non-SR gas oils	High selectivity to mid. dist.	Sph.	41	Amorphous	"P"	
DHC-6	Bifunctional, good hydro. very good cracking activity	"	"	Sph.	44	Amorphous	"P"	
DHC-8	Bifunctional, good hydro. very good cracking activity, imp. temp. stability	"	"	Sph.	44	Amorphous	"P"	
DHC-100	Bifunctional excellent, hydro. function, improved cracking activity, greater temp. stability	"	"	Ext.	"P"	"P"	"P"	
HC-8	Second stage high activity Very active, stable	"	High naphtha selectivity	Cyl.	42	Zeolite	"P"	
HC-100	Second stage high activity, much more active than HC-8	"	"	"	48	Zeolite	"P"	
HC-101	High activity, strong hydrog.	"	High LPG selectivity	"	50	Zeolite	"P"	
RCM-3	High activity, ebullating bed resid conversion units, high strength spheres	Vac. resid	Naphtha, distillates, gas oils	Sph.	41	"P"	"P"	

(Continued)

Hydrocracking—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
RCM-4	"	"	"	Sph.	39	"P"	"P"	
UNION CARBIDE CORP.								
HC-14	(See Unocal's HC listing)							
HC-16	"							
HC-18	"							
HC-22	"							
HC-24	"							
HC-28	"							
HC-30	"							
UNOCAL CORP.								
HC-14	Flexibility for fuels	Virgin cracked dist. VGO	Gaso. kero., jet	Cyl.	"P"	Mole sieve	Nonnoble metals	L
HC-16	Flexibility for fuels	"	Kero. jet, diesel	Cyl.	"P"	"	"	L
HC-18	Max. gaso., LPG gaso. naphtha	"	LPG, gaso. petrochemical naphtha	Cyl.	"P"	"	Noble metals	L
HC-22	Max. diesel, jet	"	Diesel, jet	Cyl.	"P"	"	Nonnoble met-	L
HC-28	Max. LPG, gaso. petrochemical naphtha	"	LPG, Gaso., petrochemical naphtha	Cyl.	"P"	"	Noble metal	L
HC-30	Selective HC for pour point reduction	Petroleum and shale oil fractions	Low pour point dist., lube stocks syncrudes	Cyl.	"P"	"	Nonnoble metal	L
HC-80	"	"	"	"	"	"	"	L
HC-102	Max. diesel	Virgin and cracked dist. VGO	Diesel	Sh. ext.	"P"	Amorphous	Nonnoble metal	L

Mild hydrocracking

AKZO CHEMIE/AKZO CHEMIE AMERICA/KETJEN CATALYSTS/NIPPON KETJEN (All ketjenfine catalysts available as ex-situ presulfided)								
KF-742	CoMo	VGO Conv.	Dist. boiling range mat.	AQ	45	Al_2O_3		✓
KF-840	"	"	"	"	50	"		✓
KF-1001	CoMo	"	"	Cyl.	51-54	"		✓
KF-1002	Nickel moly.	"	"	"	48	"		✓
KF-1011	"	"	"	"	51	"		✓
KF-1012	Co Mo	"	"	"	42	"		✓
KF-1014	Co Mo	"	"	"	41	"		✓
KF-1015	NiMo	"	"	"	42	"		✓
TLF-141 (Elf)	"P"	Pour pt. protection		Cycl.	"P"	"P"		L
AMERICAN CYANAMID CO.								
HCM-40	(See Unocal MHC listing)						"P"	L
HCM-110	"						"	L
BASF AG								
M 8-80	Raffination, MHC	HGO,VGO	Mid. dist.	Cyl.	0.70*	Amorph. alumina-silicates	NiO MoO_3	L
M 8-81	MHC combination with M 8-26	"	"	"	0.68*	"	"	L
BP								
MH 128	Mid. dist. selectivity	VGO	Mid. dist.	Sh. ext.	45	"P"	"P"	✓
CATALYST & CHEMICALS INDUSTRIES CO., LTD.								
HT-D3	High mid. dist. yield	VGO	Kero., diesel & desulf.	Cyl.	0.76*	Al_2O_3		✓
HT-D5	High mid. dist. yield	VGO		Cyl.	0.78*			✓
CHEVRON RESEARCH CO.								
ICR 106	High cracking activity, selective for mid-dist.	VGO, CGO, LCO, AGO	Diesel, FCC feed, LSFO	Cyl.	55-63	"P"	"P"	L
ICR 126	Longer life, higher conversion	"	Diesel, naphtha, FCC feed, LSFO	Cyl.	55-634	"P"	"P"	L
ICR 114	Lower cost	"	Diesel, FCC feed, LSFO	Cyl., sh.	42-54	"P"	"P"	L
ENGLEHARD CORP.								
HPN®-IVB	Select. hydrog. trace butadiene, isom butene to butene 2	C_3, C_4	Dimersol, alky feed	Sph.	47	"P"	"P"	L
EXXON RESEARCH & ENGINEERING CO.								
RT-2, RT-228, RT-621	See also ER&E "Hydrorefining"							L
RT-3 RTNX-1	High activity, regenerability	Virgin cracked VGO's	FCC feed prep; naphtha, mid-dist.	—	—	"	CoMo, NiMo	L
HALDOR TOPSOE								
TK-551	High stability	VGO range	Mid. dist. treated VGO	Cyl.	46	Al_2O_3	Ni Mo	✓
TK-581	"	"	"	"	46	"	"	✓
HARSHAW/FILTROL								
HPC-50	High activity N removal, polynuclear, aro. sat., high S removal activity, severe operations	HVGO, VGO, LCO CGO, coker dist., lube stocks	FCC, HC feed pretreat, lubes	Kloverleaf® cyl. ext. (4-lobed)	51	Al_2O_3	NiO, MoO_3	✓

(Continued)

Hydrocracking—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
KATALCO, DIVISION, ICI AMERICAS								
477	% of active metals	FCC feed, blends		Cyl.	45	Al_2O_3	CoMo	✓
479	"	"		Cyl.	51	"	"	✓
497	"	"		Katform	45	"	"	✓
504K	"	FCC feed, gas oil blends, HC feed. cycle oils, coker dist., tillates	FCC feed, HC feed	Cyl.	45	Al_2O_3	Ni Mo	✓
506	"			"	36	"	"	✓
594	% of active metals, shape			Katform	52	"	"	✓
596		"		"	57	"	"	✓
PROCATALYSE								
HTH 544	Good stability, high mid. dist. selectivity	HVGO		Cyl.		SiO_2/Al_2O_3	Ni Mo	✓
HTH 546	"	"		SiO_2/Al_2O + promotor	"			✓
HTH 548	"	"		"	"			✓
SHELL CHEMICAL								
MHC-1	Combined conv. & HDS activity	VGO	Mid. dist. plus treated VGO	Cyl.	0.86*	Al_2O_3	Ni Mo	✓
S-424	"	"	"	Sh. ext.	0.82*	"	"	✓
MHC-200	Low pressure MHC	"	"	"	0.76*	"	Co Mo	✓
UNOCAL CORP.								
HCM-40	High stability MHC	Virgin & cracked dist., VGO	Dist. + hot feed hydrotreated	Sh. ext.	"P"	"P"	"P"	L
HCM-110	"	"	"	"	"P"	"	"	L
UNITED CATALYSTS INC.								
C20-7-02	Composition, physical properties	Lube oil, HVGO HVGO	Hydrog. of olefins, cracked prodct	Ext.	44	Al_2O_3	Ni Mo	✓
C20-7-02CDS	"	"	"	"	"	"	"	✓
C20-7-04	"	"	"	"	50	"	"	✓
C20-7-06CDS	"	"	"	Ext.	44	"	"	✓
UOP INC.								
DHC-2	Bifunctional clean-up, hydrog. good cracking activity	VGO, CGO	Dist., HDS, lubes	Sph.	41	"P"	"P"	✓
MHC-10	Bifunctional, high hydro. cracking activity	"	"	Cyl.	42	"P"	"P"	✓

Hydrotreating/hydrogenation, saturation catalysts

AIR PRODUCTS & CHEMICALS INC.								
HR 836	Pretreat	Py gaso.	Sat. hydrocarbons	Cyl.		Al_2O_3	Co Mo	L
AKZO CHEMIE/AKZO CHEMIE AMERICA/KETJEN CATALYSTS (all ketjentine catalysts available as ex-situ presulfided)								
Active supports	Used to support bed, for feed distribution in reactor top, relative low activity, reduced coking and pressure drop, sat. of diolefins in cracked feeds (AQ = assymetric quadralobe)							
A-540	Ni Mo			AQ	36	Al_2O_3		✓
A-541	Co Mo			AQ	36	"		✓
KAS 082-5B	Ni Mo			Sph.	52	"		✓
AS-20	Ni Mo			AQ		"		✓
KF-H-OIL	Co Mo	Resid, hvy. crude, tons, etc.	Dist, LSFO	Cyl.	"P"	Al_2O_3		L
KF-H-OIL	Ni Mo	"	"	"	"			✓
KFR-10	Ni Mo	HDM of resid	"	AQ		"		✓
KFR-30	"	HDM/HDS of resid		AQ		"		✓
KFR-50	"	HDS of resid		AQ		"		✓
KF INT-RI	"	HDM of resid		AQ	36	"		✓
KF 153/153S	Ni Mo	SR, cracked napthas, dist., VGO, LCO, lube		Cyl.	48	Al_2O_3		✓
KF 842	"	SR, cracked naphthas, dist., VGO		AQ	42-45	"		✓
KF 844	"	Coker naphtha		AQ	42-45	"		✓
KF 840	High Act. Ni Mo	SR, cracked naphtha, dist. VGO		AQ	50	"		✓
KF 843	High act, Aro sat. Ni Mo	LCO, VGO, HC lube		AQ	56	"		✓
KF 603	Ni, Co Mo	HDM, HDS, resid		Cyl.	42	"		✓
KF 643	"	"		AQ	39	"		✓
KF 604	Ni Mo	"		Cyl.	45	"		✓
KF 644	"	"		AQ	41	"		✓
KF 609	Ni, Co Mo	"		Cyl.	37	"		✓
KF 649	"	"		AQ	37	"		✓
KF 330	Ni W	H, Pi lube, diolefin Sat.		Cyl.	52	"		✓
KF 124 LD	Co Mo	SR naphthas, dist. gas oil, VGO		Cyl.	38	Al_2O_3		✓
KF 124 HD	"	Naphtha, kero., gas oil, VGO, lube		"	48	"		✓

(Continued)

Hydrotreating/hydrogenation, saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
KF 165	"	SR, cracked naphtha, dist., VGO, LCO, lube		Cyl.	49	Al_2O_3		✓
KF SC-1315	Shell oil catalyst							✓
KF 640	Cobalt Co Mo, high act.	Naphtha, kero. gasoil, VGO		AQ	41	Al_2O_3		✓
KF 742	Co Mo, high act.	SR, & cracked , naphtha dist. VGO, lube py. naphtha		AQ	45	"		✓
KF 702	"	SR, cracked naphtha, dist. VGO; Lube, py.		AQ		"		✓
KF 707	"	"		AQ	48	"		✓
KF 742	"	SR, & cracked naphtha, dist. VGO; lube, py. naphtha		AQ	45			✓
AMERICAN CYANAMID CO.								
HDS-2(1.6) HDS-2(3.2)	Different particle sizes	Naphthas through LGO		Cyl.	36	Al_2O_3	CoO, MoO_3	✓
HDS-3(1.6) HDS-3(3.2)	Different particle size & shapes	Naphthas through LGO		Cyl. sh. ext.	44-47	Al_2O_3	NiO MoO_3	✓
TRILOBE® HDS-3(1.6)	"	"		"		"	"	✓
TRILOBE® HDS-3(3.2)	"	"		"		"	"	✓
HDS-9(1.6) HDS-9(3.2)	Different particle size & shapes	Naphthas through HGO		Cyl. or sh. ext.	49-52	Al_2O_3	NiO MoO_3	✓
TRILOBE® HDS-9(1.6)	"	"		"		"	"	✓
TRILOBE® HDS-9(3.2)	"	"		"		"	"	✓
TRILOBE® HDS-20(1.6) HDS-20(3.2)	Different particle sizes	Naphthas through HGO		Sh. ext.	~ 46	Al_2O_3	CoO MoO_3	✓
TRILOBE® HDN-30(1.6) HDN-30(3.2)	Different particle sizes	Naphthas through HGO		Sh. ext.	~ 52	Al_2O_3	NiO MoO_3	✓
TRILOBE® HDS-35(1.6) HDS-35(3.2)	Different particle sizes	Naphthas through LGO		Sh. ext.	~ 46		NiO, CoO, MoO_3	✓
AS-100	(See Unocal listing)							L
TRILOBE® HDN-60(1.6) HDN-60(3.2)	Different particle sizes	Naphthas through HGO		Sh. ext.	~ 54	Al_2O_3	NiO, MoO_3	✓
RT-3	(See Exxon R&E listing)							L
IMP-DSD-3	(See Instituto del Mexicano Petroleo Listing)							L
TRILOBE® HDS-24 (1.6) HDS-24 (3.2)	Different particle sizes	Naphthas through HGO		Sh. ext.	~ 35	Al_2O_3	CoO MoO_3	✓
TRILOBE® HDN-34(1.6) HDN-34(3.2)	"	"		"	~ 35	"	NiO, MoO_3	✓
RIFLED® TRILOBE® HDN-60(1.6) HDN-60(3.2)	"	"		"	~ 50	"	NiO, MoO_3	✓
CSM-481, CSM-482		"		"	"P"	"P"	"P"	L
TRILOBE® HDS-22 (1.6) HDS-22 (3.2)	Different particles	"		"	~ 43	Al_2O_3	CoO, MoO_3	✓
BASF AG								
M 8-12		LPG, nat. gas SR fractions, blends with cracked oils, py gaso.	Steam reforming feed, cat. reformer feed, jet diesel feed for aro. extract.	Cyl.	0.65*	$\gamma-Al_2O_3$	CoO, MoO_3	✓
M 8-14	More active for hvy. fractions	HGO, VGO, SR, blends, with cracked oils, paraffins, lube	Jet, diesel, HC feed, tech. white lube oil	Star shaped	0.60*	$\gamma-Al_2O_3$	"	✓
M 8-24		Blends of SR fractions with cracked oils	Cat. reformer feed	Cyl.	0.70*	$\gamma-Al_2O_3$	NiO, MoO_3	✓

(Continued)

Hydrotreating/hydrogenation, saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
M 8-24	More active for hvy fractions	Blend of HGO, or VGO with cracked oils, lube	Gas oil, FCC feed, lube oil	Star shaped	0.65*	$\gamma-Al_2O_3$	NiO, MoO_3	✓
M-8-26	High HON, HDS act., olefin hydrog.	Naphtha, kero, GO, VGO, HGO	HC pretreat	Starshaped & cyl.	0.82*	Special	NiO, MoO_3	✓
H 0-11		Selective hydro. of acteylene acetylene in ethylene	Ethylene	"	0.46*	SiO_2	Pd	✓
H 0-12		Selective hydro. of acetylenes in C_3- and C_4-		Cyl.	1.1*	Al_2O_3	Pd	✓
H 0-22		Selective hydro. of diolefins & unsat aromatics	Py. gaso.	Cyl. sph.	0. 65*-0.80	"	Pd	✓
H 1-80		Hydro. of aromatics aromatics	Food-grade white oil	Cyl.	1.0*	SiO_2	Ni	L
EXXON RESEARCH & ENGINEERING CO.								
RT-3 RT-NX-1	High activity, regenerability	Virgin cracked VGO's, distillates	Feed prep. for cat. ref. FCC, S, N removal etc	—	—	—	Co/Ni Mo	L
HALDOR TOPSOE								
TK-250/251		Nat. gas, refinery gas. SR naphtha	Deep HDS, steam reforming cat. reforming HDS olefin sat. of refinery gases	Ring	32	Al_2O_3	Co Mo(250) Ni Mo (251)	✓
TK-450/451	Naphtha to LGO	Deep HDS	"	Cyl.	34	Al_2O_3	Co Mo (450)/ Ni,Mo (451)	✓
TK-551		SR & cracked naphthas HVGO	Deep HDS, HDN, aro.	Ring cyl.	46	"	Ni Mo	✓
TK-550	Lower selectivity for HDN, aro. sat. TK-551, lower H_2 consumption	"	Deep HDS	Ring cyl.	44	"	Co Mo	✓
TK-561	Extra high HDN act.	"	"	Cyl.	50	"	NiMo	✓
HARSHAW/FILTROL								
HPC-6	Low density, high pore vol.	Naphtha through VGO	HDS	Kloveleaf®, or Cyl.	33	Al_2O_3	CoO, MoO_3	✓
HPC-6B	Low density	"	HDS	"	39	"	"	✓
HPC-40B	HDS, HDN	CGO, HVGO, LCO, CGO, coke dist., naphtha, lube	FCC feed, gaso. jet	"	47	"	Nio, MoO_3	✓
HPC-50	HDS, HDN, PNA sat.	"	FCC feed lube, gaso. jet	"	51	"	"	✓
HPC-70	High act. HDS, HON, PNA sat. severe operations	"	FCC Feed, HC pretreat., lube	"	51	"	"	✓
HPC-66	HDS	HS HGO, heating oil, naphtha	GO, heating oil, gaso.	"	44	"	CoO, MoO_3	✓
HPC-60	High act. HDS	"	"	"	46	"	"	✓
INSTITUTO MEXICANO DEL PETROLEO								
IMP-DSD-3	High act. trilobe	Petro. fract.	Naphtha for reforming, high diesel act. FCC feed	Sh. ext	0.74*	γ-Al_2O_3	Mo, Ni, P	L
IMP-DSD-4	High act. sphere	"	"	Sph.	0.55*	γ-Al_2O_3	Mo, Ni	L
IMP-DSD-5	Good activity sphere	Gasolines to diesel HDS	Naphtha for reforming good quality diesel	Sph.	0.55*	γ-Al_2O_3	Mo, Ni, P	L
IMP-DSD-1	Good activity sphere	"	"	Sph.	0.86*	γ-Al_2O_3	Mo, Ni	L
KATALCO DIVISION, ICI AMERICAS								
477	% of active metals, shape	SR naphtha through gas oil/resid blends		Cyl.	46	Al_2O_3		✓
477S				Sph.	36	"	"	✓
479				Cyl.	52			✓
497	"	"		Katform	45	"	"	✓
499	"	"		"	51	"	"	✓
482	Active metal	Sour gases, Lt. hydro. carbon		Cyl.	32	"	"	✓
502	% of active metals, shape	SR naphtha through gas oil/resid blends		Cyl.	46	Al_2O_3,	NiMo	✓
502S				Sph.	36	"	"	✓
504K				Cyl.	56	"	"	✓
506				Cyl.	58	"	"	✓
592	"	"		Katform	45	"	"	✓
594	"	"		Katform	52	"	"	✓
596	"	"		Katform	57	"	"	✓
550	Shape	Cracked stocks/cycle oil, jet, lubes		Cyl.	50	Al_2O_3	NiW	✓
550S				Sph.	37	"	"	✓
PROCATALYSE								
LD 271	Selective hydrog. of propylene rich cut from steam cracking, also butene-1 rich cut	Steam cracker propylene rich, butene-1 rich cut	Propylene, butene 1	Sph.		Al_2O_3	Pd promoter	✓

(Continued)

Hydrotreating/hydrogenation, saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
LD 275	Selective hydrog. of pyr. gaso. fractions	Pyr. gaso.	Gaso.	Sph.		Al_2O_3	Pd promoter	✓
LD 277	Acetylene removal from butadiene rich steam cracker cut	C_4 steam cracker cut	Butadiene rich C_4 cut	"		Al_2O_3	Pd promoter	✓
LD 2773	Selective hydrogen. of butadiene in butene rich cuts from FCC	FCC C_4 cut	C_4 cut	"		"	"	✓
LD 277	MAPD removal from FCC propylene cuts	FCC C_3 cut	C_3 cut	"		"	"	✓
Ni PS_2	Total hydrog. of benzene into cyclohexane	Benzene	Cyclohexane	Powder		Ni	Ni	✓
LT 261	Selective hydrog. of ethylene ethylene	Ethylene cut (vapor phase)	Ethylene	Sph.		Al_2O_3	Pd	
LD 145	Selective hydrogen. of py. gaso. and 180 400° C. fraction	Py. gaso.	Gaso.	"		Al_2O_3	Ni Mo	
LD 155	"	Py. gaso. hvy. gaso.	Gaso., special fuel	"		"	Ni W	
LD 241	Selective hydrogenation of pyrolysis gasoline	Py. gaso. line	Sweet gaso.	Sph.		Al_2O_3	Ni	
LD 265	Selective hydrogen. of pyrolysis propylene cut, butylene cut, and gaso.	Pyrolysis propylene cut, butylene cut, gaso.	Propylene, butylene, gaso.	"		"	Pd	
HC 102	Total hydrogenation	Benzene	Cyclohexane	Liquid			Ni	✓
Cu 640	Hydrogenation	Aldehydes	Alcohols	Cyl.		SiO_2	Cu	✓
Ni 563	Hydrogenation	Aldehydes, unsat. drocarbons	Alcohols, solvents	Pellets		"	Ni	✓
SHELL CHEMICAL								
S 214	Multi purpose HDT	Naphtha to HVGOs		Sh. ext.	0.71*	Al_2O_3	Ni Mo	✓
S 324	High performance, HDS, HDN	Coker naphtha and py. gaso. to HVGOs		Cyl.	0.86*	"	"	✓
S 324T	"	"		Sh. ext.	0.80*	"	"	
S 424	High activity HDS, HDN, sat.	Pretreat. cracker feed, 1st stage HC		Sh. ext.	0.82*	Al_2O_3	Ni Mo	✓
S 411	"	"		"	0.85*	"	"	✓
S 514	Support function-replaces inert ceramic material.	All HDT applications-preferentially cracked feeds		Sph.	0.80*	Al_2O_3	Ni Mo	✓
S 344	Heavy duty HDS	Wide variety of stocks, HVGO		Cyl.	0.78*	Al_2O_3	Co Mo	✓
S 344T	"	"		Sh. ext.	0.73*	"	"	
S 444	High activity HDS	VGC, LGO, HGO Cracked GO		Cyl.	0.77*	Al_2O_3	Co Mo	✓
S 444T	"	"		Sh. ext.	0.72*	"	"	
S 447	Deep HDS	VGO, resid. LGO, LGO, HGO		Sh. ext.	0.71*	"	"	✓
S 544	Support function. Can replace all ceramic material.			Sph.	0.80*	Al_2O_3	Co Mo	✓
S 127	Initial residue HDS	Heavy resid. with moderate metal content.		Cyl.	0.70*	Al_2O_3	Ni Mo	✓
S 227	Tail end deep residue HDS	Heavy resid. with moderate metal content		"	0.70*	"	"	✓
S 147	Initial residue HDS	Heavy resid. with modererate metal content.		"	0.70*	Al_2O_3	Co Mo	✓
S 247	Tail end deep residue HDS	Heavy resid. with moderte metal content.		Cyl.	0.70*	Al_2O_3	Co Mo	✓
S 311	Hydrocracker tail end	Hydrocracked feed		Sh. ext.	0.76*	"	Ni Mo	
S 614	Hydrog. of aromatics	Kero. specialty oils		Cyl.	0.41*	SiO_2/Al_2O_3	Pt	✓
S 204	Hydrogenation of di-olefins	Pyrolysis gaso.		"	0.72*	Al_2O_3	Ni	✓
S 504	"	Py. gaso. line	Support balls, replaces inert ceramic material	Sph.	0.80*	"	"	✓
UNOCAL CORP.								
HC-B, HD-D, HC-F, HC-H, HC-K	(See Unocal Hydrorefining listing)							
AS-100	Saturation of aromatics	Naphtha, kero, jet fuel	Low aro. naphthas, high smoke point kero., jet	Cyl.	"P"	"P"	Noble metal	L
N-21, N-22, N-23, N-30 N-100	(See Unocal Hydrorefining listing)							

(Continued)

Hydrotreating/hydrogenation, saturation catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
UNITED CATALYSTS INC.								
C20-5-01		SR, coker naphtha, Kedro. diesel	HDS, removal of metal contaminants imp. color, odor, stability	Tablet or ext.	50	Al_2O_3	Co Mo	✓
C20-6-01	Composition, physical properties	Lt. naphthas through heavy residues	HDS hydrog. of olefins	Ext. 1/8-in. or 1/16-in.	38	Al_2O_3	Co Mo	✓
C20-6-03	"	"	"	"	44	"	"	✓
C20-6-04	"	"	"	"	51	"	"	✓
C20-7-02	Composition physical properties	Cracked stocks, high olefin N content feed	HDS, HDN, hydrog. of olefins, de-wax	"	44	"	Ni Mo	✓
C20-7-03	"	"	"	"	38	"	"	✓
C20-7-04	Composition physical properties	Cracked stock, high olefin and nitrogen content feedstocks	HDS, HDN, hydrog. of olefins, de-wax	Ext.	50	"	"	✓
C20-6-04 CDS	High HDS activity	VGO, LGO, HGO		Ext.	37-43	Al_2O_3	CoMo	✓
C20-7-07 CDS	High HDS, denitrification activity	Pretreat. FCC feed	FCC feed	Ext.	47-53	"	NiMo	✓
G-87	Total hydrogen. of Benzene to Cyclohexane	Benzene	Cyclohexane	Sph.	52-58		Ni	✓
G-98B	"	Bz with S present	"	Tab	48-52	SiO_2	NiCuCo	✓
C46-7-03	High hydrogen. activity	Aro. sat		Ext.	40-48	SiO_2	Ni	✓
C46-8-03	"	"		Ext.	40-48	Al_2O_3	Ni	✓
G-68A	Hydrogen. of C_5 dienes	Isoprene		Tab	32-38	"	Pd	✓
G-68C	Selective hydrogen. DPG-diolefins	Py. gaso.	Gaso.	Sph.	42-48	"	"	✓
G-68D	Selectivity hydrogen. trace butadiene & isomerize B1 to B2	C_3 - C_5 stream	Alky. feed	Tab	64-69	"	"	✓
C38-1	Selective hydrogen. trace butadiene with isomerization	C_3 - C_5 stream with S	"	Ext.	52-58	Al_2O_3	Ni	✓
C20-7-06CDS	"	"	"	Ext.	44	"	Ni Mo	✓
UOP INC.								
S-12	High HDS, HDN	Naphtha through VGO, cracked stocks, high severity	HDS, HDN	Cyl.	49	Al_2O_3	Co Mo	✓
PF-4	Selective hydrogenation	Alphamethylstyrene in Cumene. Diolefin Sat.-	Cumene, py. gaso.	Sph.	32	Al_2O_3	Pd	
H-3	High hydrogenation activity, S tolerant	Aro. sat (usually benzene)	High-purity cycloparaffins (usually cyclohexane) ane)	Sph.	32	Al_2O_3	Pt	
H-4	High hydrogenation activity	" plus selective diolefin sat., meth.	"plus upgrade alky feed"	Sph.	44	"	Ni	
H-8	"	Aro sat. dist. Sat. of residual aromatics in N-Paraffin streams	Improved burning or ignition qualities. High purity N-Paraffins	Sph.	32	"	"	

Hydrorefining

AKZO CHEMIE/AKZO CHEMIE AMERICA/KETJEN CATALYSTS/NIPPON KETJEN								
HC-K	Co Mo, high act.	SR, cracked naphthas, dist. VGO, LCO		Cyl.	48	Al_2O_3		L
RF-100, 200, 220	(See Unocal Hydrorefining listing)			AQ				L
RT-2, RT-3, RT-621, RT-228, RT-NX-1, TN-8	(See Exxon Research & Engineering Hydrorefining)							
AMERICAN CYANAMID CO.								
HC-B, HC-D, TRILOBE® HC-F, HC-H	(See Unocal HF listing)			Cyl. or Sh. ext.				L
TRILOBE® RF-11, RF-25	(See Unocal HF listing)			Sh. ext.				L
RT-2	(See Exxon R&E HF listing)							L
RT-3	(See Exxon R&E HF listing)							L

(Continued)

Hydrorefining—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
CSM-471		Resid HDT		Sh. ext.	"P"	"P"	"P"	L
HDS-1442A HDS-1442B	Different particle sizes	Resid or VGO HDT		Cyl.	~ 34	Al_2O_3	CoO MoO_3	✓
HDS-1443-A HDS-1443-B	Different particle sizes	"		Cyl.	~ 36	"	NiO MoO_3	✓
HDS-9(1.6) HDS-9(3.2) HDS-9(1.6) HDS-9(3.2)	Different particle sizes and shapes	HGO/cat. feed HDT	Fuel oil/FCC feed	Cyl. or sh. ext.	49-52	"	"	✓
TRILOBE® HDS-20(1.6) HDS-20(3.2)	Different particle sizes	"	Fuel oil/FCC feed	Sh. ext.	~ 46	"	"	✓
TRILOBE® HDN-30(1.6) HDN-30(3.2)	"	"	Fuel oil/FCC fead	Sh. ext.	~ 52	"	NiO MoO_3	✓
GC-100, 101, 102, 105, 106, 107	(See Chevron Research HF listing)							L
TRILOBE® HDN-60(1.6) HDN-60(3.2)	Different particle sizes	HGO/cat. feed HDT	Fuel oil/FCC feed	Sh. ext.	~ 54	Al_2O_3	NiO MoO_3	✓
GC 405, 36, 30, 26	(See Chevron Research HF listing)							L
N-21, N-22, N-23 N-30	(See Unocal HF listing)							L
RIFLED® TRILOBE® HDN-60(1.6) HDN-60(3.2)	Different particle sizes	HGO/cat. HDT		Sh. ext. ext.	~50	Al_2O_3	NiO MoO_3	✓
CSM-481 CSM-482		HGO thru resid		Sh. ext. ext.	"P"	"P"	"P"	L
CDM-152		"		"	"	"	"	L
TRILOBE® HDS-22 (1.6) HDS-22 (3.2)	Diff. particle size	Fuel oil, FCC feed		Sh. ext.	~ 43	Al_2O_3	CoO, MoO_3	✓
BASF AG								
M 8-21		Raw lube feed	Lube oil, white oil	Cyl.	Ca. 72*	Al_2O_3	Ni Mo	
M8-23	Raffination	Aro. Hydrog.	Food grade	Cyl.	0.82	γ Al_3O_3	NiO, MoO_3	
H 1-80		Aro. Hydrog.	"	"	1.0*	SiO_2	Ni	✓
CATALYST & CHEMICALS INDUSTRIES CO., LTD.								
CDS-R2	High HDS, low reaction temp.	Atm. & vac. resid	Desulfurized oil	Cyl.	0.68*	Al_2O_3	—	✓
CDS-R9	High HDS & demet.	Atm. & vac. resid	Desulfurized oil	Cyl.	0.66*		—	✓
CDS-DM-1	High demet.	"	Demetalized oil	Cyl.	0.58*	"	—	✓
CDS-DM5	High deme. with desulfurization ability	"	"	"	0.62*	"		
CDS-D5	High HDS activity	Naphtha & kero.	Desulfurized naphtha, kero.	Cyl.	0.68*	—	—	✓
CDS-D9	"	Naphtha, kero. gas oil	Desulfurized Kero, VGO		0.72*	Al_2O_3		
CDS-D11	"	Kero. diesel, VGO	Desulfurized, kero. diesel, VGO	Cyl.	0.73*	—	—	✓
CDS-D13	Superior high HDS activity	"	"	"	0.78*			✓
CDS-DN1	High HDS and HDN activity	Naphtha	Desulfurized naphtha	"	0.77*	"		
CDS-DR1	High HDS activity	20-30% Atm. resid, and 80-70% VGO	FCC feed, desulfurized oil	"	0.70*	"		
CHEVRON RESEARCH CO.								
ICR 112	High HDS activity, low H_2 consumption	VGO, CGO	LSFO, FCC feed	Cyl.	53	"P"	"P"	L
ICR 114	High HDN activity	VGO, CGO	FCC feed	"P"	57	"P"	"P"	L
ICR 105	Designed for resid HDT	DAO, topped crudes, atm. vac. resids	LSFO, FCC feed, coker feed	Cyl.	49	"P"	"P"	L
ICR 121	Resid feeds	"	"	"P"	43	"P"	"P"	L
ICR 122	Resid HDM	"	LSFO, FCC feed, resid HDS feed, coker feed	"P"	30	"P"	"P"	L
GC-101 GC-106	High metals resist.	HDS, atm., vac, resid	0.5-1.0% S HFO	Cyl.	30-40	Al_2O_3	"P"	L
GC-102 GC-107	High coke deactivation resist. HDS cat.	HDS amt., vac. resids amt. & vac.	0.2-0.6% sulfur HFO, resid FCC feed prep.	Cyl. Sh. "	33-41	Al_2O_3	"P"	L
GC-100 GC-105	High severity HDS resid HDS	"	0.05-0.2% S HFO	Cyl. sh.	33-42	"	"P"	L
GC-125 GC-130	Metals resist.	High metals, atm., vac. resids	Demet./HDS	Cyl. Sh. ext.	30-37	"	"P"	L

(Continued)

Hydrorefining—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
GC-405	High activity, hydrogenation, selective hydrocracking	Conventional refined, virgin lube feed	Lube, base oils	Cyl. Sph.	40-48(c) 32-38 (s)	Al_2O_3	"P"	L
GC-36	High activity hydro., selective HC	Poor quality lube feed	"	Cyl.	50-55	SiO_2, Al_2O_3	"P"	L
GC-30	Higher activity.	"	"	Cyl.	50-60	"	"P"	L
GC-26	Selective hydro.	Semi-refined lube, specialty oil product feed-	Lube industrial oils, specialty products	Cyl.	60-70	Al_2O_3	"P"	L
EXXON RESEARCH & ENGINEERING CO.								
RT-2 RT-228 RT-621	Contaminant tolerant for resid processing	Atm. vac. resids	Feed prep for FCC, coking LSFO, Lt. dist.	—	—	Tailored pore size supports	Co Mo., Ni Mo	L
RT-3, RT-NX-1	High activity, regenerability	Virgin/cracked VGO's dist.	Feed prep. for cat. reforming, FCC, S, N removal	—	—	—	Co/Ni Mo	L
HALDOR TOPSOE								
TK-550 TK-551	Smaller pore for lighter feeds "	AGO, VGO VGO, FCC feed, CGO	HDS HDS, HDN, PNA	Ring Ring, Cyl.	37/46 37/46	Al_2O_3	Co Mo Ni Mo	✓ ✓
TK-5[illegible]1	Larger pore, cat. heavier feeds	"	"	Ring	37/46		Ni Mo	✓
TK-70[illegible]	Low HDS activity, high HDM selectivity, high metals	Atm resid, vac. resid, DAO	Front end HDS, HDM	Ring	25 33	Al_2O_3	Mo	✓
TK-710/711	Slightly higher HDS act. high HDM selectivity, high metals	"	"	Ring	31/40	" "	Co Mo (710) Ni Mo (711)	✓
TK-750/751	Medium HDS activity, HDM selectivity metals tolerance	"	Intermediate in HDS, HDM	Ring	31/40	"	Co Mo (750) Ni Mo (751)	✓
TK-770/771	High HDS activity, low HDM selectivity, limited metals tolerance	"	Final cat. in HDS, HDM	Cyl.	45	"	Co Mo (770) Ni Mo (771)	✓
INSTITUTO MEXICANO DEL PETROLEO								
IMP-HDW-10	Zeolitic for dewaxing lube oil cuts	Wide range of lube	Dewaxed lube-	Cyl.	0.80*	Zeolite Al_2O_3	Pt/Zeolite	L
KATALCO DIVISION, ICI AMERICAS								
477, 477S, 479, 497, 499	(See also Katalco Corp. Hydrotreating, etc.)							
502, 504,506, 592, 594, 596	"							
UNOCAL CORP.								
N-30	High activity, HDS	Virgin, cracked dist. naphthas, VGOS	Desulfurized products	Sh. ext.	"P"	"P"	Co Mo	L
N-100	"	"	"	Cyl.	"P"	"P"	"	L
N-23	"	"	"	Cyl.	"P"	"P"	"	L
N-22	HDS, HDN	"	Low S, low N products	Cyl.	"P"	"P"	Ni Mo	L
N-21	"	"	"	Cyl.	"P"	"P"	"	L
HC-H	HDS, HDN	Virgin, cracked dist. VGO	HC, & FCC Feed	Sh. ext.	"P"	"P"	Ni Mo	L
HC-K	"	"	"	"	"P"	"P"	"	L
HC-F	"	"	Dist. products, HC FCC feed	"	"P"	"P"	"	L
HC-D	"	"	"	Cyl.	"P"	"P"	"	L
HC-B	"	"	"	Cyl.	"P"	"P"	Ni Mo	L
RF-11	HDS	Atm. resid., whole crudes	Fuel oil, FCC coker feed	Sh. ext.	"P"	"P"	"P"	L
RF-25	High activity bifunctional demet.	"	"	"	"P"	"P"	"P"	L
RF-100	HDS	"	"	"	"P"	"P"	"P"	L
RF-200	High activity bifunctional demet.	"	"	"	"P"	"P"	"P"	L
RF-220	"	"	"	"	"P"	"P"	"P"	L
UOP INC.								
RCD-5	Metals tolerance, HDS	Atm. or vac. resid.	LSFO, cracking, coker feed	Sph.	41	Al_2O_3	Co Mo	Contact UOP
RCD-5A	High activity for HDS, mod. metal tolerance	"	"	Sph.	46	"	"	"
RCD-7	High activity for S and Con. Carbon Removal	Demeatallized oil, deasphalted resid	LSFO, cracking feed	Cyl.	53	"	"	"
RCD-8	High metals tolerance, high demet. mod. HDS moderate HDS activity	Atm. vac. resid., deasphalted resid.	LSFO, cracking coker feed	Cyl.	36	"P"	"P"	"
RCD-9	High metals tolerance, high deme. high HDS activity	"	"	Cly.	37	"P"	"P"	"

(Continued)

Hydrorefining—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
PROCATALYSE								
HR 306	HDS, HDN	Naphtha through VGO		Cyl.		Al_2O_3	Co Mo	√
HT 308	HDT	Residues		"	0.67*	"	Co Mo	√
HR 346	HDS, HDN, hydro.	Residues		Cyl.	"	"	Ni Mo	√
HR 348	HDS, HDN, hydro. aromatics	Naphtha through VGO	Desulfurized N-free, hydro. product	Cyl.	0.77*	"	"	√
HR 354	HDS, HDN, aro. hydrog.	Naphtha through VGO	N-free, hydro product	Cyl.		Al_2O_3	W Ni	√
HMC 841	HDT, HDM	GO, VGO, atm., vac. resid.		Sph.		Al_2O_3	NiMO	√
HMC 849	HDM	"		"		"	NiMo	√
HMC 845	HDT, HDM	"		"		"	NiMO	√
Actispheres 923	Catalyst protection and support	Naphtha through atm. resid		"		"	Ni, Co, Mo	√

Polymerization

INSTITUTO MEXICANO DEL PETROLERO								
IMP-TPC-1	High selective extrudate	Propylene	Propylene tetramer, high oct. gaso.	Cyl.	0.88*	Kieselgurgh	H_3PO_4	L
UNITED CATALYSTS INC.								
C84-1-01 & C-84-02-04	Particle size	Propylene, benzene, butenes	Cumene polygaso. higher olefins	Sph.	55	Diatomaceous earth	H_3PO_4	√
C84-3-01 & C84-3-02	Form, particle size	"	"	Ext.	"	"	"	√
UOP INC.								
SPA-1	High act. & select. larger size chamber reactor	Propylene, butenes, pentenes, benzene, toluene	Petrochemicals, gaso., tetramer, cumene, cymene	Cyl.	58	SiO_2	H_3PO_4	Contact UOP
SPA-2	Small size for tubular reactor	"	"	"	58	"	"	Contact UOP

Sulfur (elemental) recovery

ALCOA								
S-100 1/4-in	Lower pressure drop	Claus feed hydrocarbons	Withstands pressure drop due to coking and ammonia. All converters and subdew point tail gas processes.	Sph.	45	Activated Al_2O_3	Activated Al_2O_3	√
S-100 3/16-in.	Higher activity	Refinery or nat. gas	All converters and subdewpoint tail-gas processes	"	45	"	"	√
S-100 5/16-in.	Ext. low pressure drop		Withstands extreme coking and ammonia.	Sph.	45	"	"	√
SP-100 3/16 in.	Promoted, lower pressure drop	High COS and CS_2 conversion	COS and CS_2 conversion. Withstanding fouling due to cracking of aromatics.	"	47	Activated Al_2O_3	"P"	√
SP-100	Promoted	High COS and	" CS_2 conversion	"	47	"	"P"	√
SRU 1/2-in. 3/8-in.	Active bed support, high physical strength	All claus plants	High strength bed support and hold down with claus activity	Sph.	50	Activated Al_2O_3	Activated Al_2O_3	√
ARI TECHNOLOGIES								
ARI-310	Active ingredient in chelated aqueous solution	Refinery gas, sour water stripper gas, amine tail gas, nat. gas	Elemental S	Liquid	74.8	None	Fe	L
CATALYST & CHEMICALS INDUSTRIES CO. LTD.								
CSR-2	High Claus activity	Claus reaction feed feed gas.	S	Sph.	0.84*	Al_2O_3	—	√
CSR-3	High hydrolysis of organic sulfide	"	"	"	0.87*			
CSR-7	High prevention of sulfation	Claus reaction feed	S	Sph.	0.80*	"	—	√
ENGELHARD CORP.								
SuReCat® 2-4, 3-6	High act., low attr. promoted sulfur resist.	Gas with 2:1 H_2S/SO_2	Purified gas, S	Sph.	50-52	Al_2O_3	Al, Ti, Fe oxide	√
SRC 2-4	High Claus activity		Purified gas, S	Granules	53	Al_2O_3	"	√
SRC-4-8	Higher than SRC 2-4 activity		"	"	55		"	√

(Continued)

Sulfur (elemental) recovery—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
LPD 5-16	Modest activity. Bed support	"	"	Ext.	52	Al_2O_3	Al, Ti, Fe oxide	✓
LPD 5-8	Modest activity, bed support only	"	"	Ext.	52			✓
KAISER CHEMICALS								
S-301 3 × 6 1/2 × 1/4	High porosity, high activity, lowest attrition	H_2S, CO_2 conv. conv. COS, CS_2 conversion	S	Sph.	45	Activated Al_2O_3	Activated Al_2O_3	✓
S-201 3 x 6, 1/2 x 1/4	Standard high porosity	H_2S and SO_2 con., COS, CS_2 con.	"	"	45	" alumina	" alumina	✓
S-200 3 × 6 1/2 × 1/4	Low attrition, mod. activity CS_2 conv.	H_2S and SO_2 converstion	"	"	48	"	"	✓
S-501 3 x 6, 1/2 x 1/4	Promoted, sulfation resist.	Improved COS, CS_2 conv.	"	"	52	"	"P"	✓
S-701	Plus thermal stability	Very high CS_2, COS, conv. and H_2S conver.	"	Kloverleaf®	52	"	"P"	✓
RHONE POULENC								
CR 4-6	High pore volume	H_2S	S	Sph.	0.67*	Al_2O_3		✓
DR 5-16	First generation Claus	"	"	"	0.75*	"		✓
AM 4-6	Sulfation protection	"	"	"	0.75*	"	Fe	✓
CRS 21	High COS, & CS_2 conv.	"	"	"	0.71*	"	TiO_2	✓
CRS 31	High COS, CS_2 conv. Unsulfatable	"	"	Cyl	0.95*	TiO_2	TiO_2	✓
CT 739	Catalytic incineration	H_2S & SO_2	SO_2	Sph.	0.60*	SiO_2	Fe	✓
SHELL CHEMICAL								
S 949	High activity Claus, high COS, CS_2 hydrolysis		S	Sph.	0.53*	SiO_2	—	✓
UNOCAL CORP.								
Selectox-32	Solid for oxidation of H_2S to S	Acid gas from refineries, nat. gas plants, or waste treatment plants.	S, no SO_3	Cyl.	"P"	"P"	Non-noble metals	L
Selectox-33	"	"		"	"	"	"	L

Steam hydrocarbon reforming catalysts

BASF AG								
M 8-12	Hydrogen. of organic S compounds	Nat. refinery gas, LPG, Lt. naphtha	Steam reformer feed	Ext.	0.72*	Al_2O_3	Co Mo	✓
M 8-21	"	high CO_2	"	"	0.72*	"	Ni/Mo	✓
R 5-10	Removal of H_2S	S containing gas	"	"	1.2*	—	ZnO	✓
G 1-25	Steam reforming (gasification)	Nat. & refinery gas	Process gas, CO-shift	Rings	1.1-1.25*	Al_2O_3	Ni	✓
G 1-25 S	"	"	"	"	0.9*	" High therm. stab.	Ni	✓
G 1-50	"	LPG naphtha	"	Rings	1.1*	—	Nickel, alkalized on special carrier	✓
G 1-80	Autothermal steam reforming	Naphtha/LPG	Process gas, tubular reformer	Tablets	"P"	"P"	Ni	L
K 6-10	High temp. shift conv.	Process gas, ex. steam reforming/partial oxidation	Process gas for H_2 prod.	Tablets	1.0*	—	Fe, Cr oxide	✓
K 8-11	Shift conversion	Process gas ex. partial oxidation	"	Ext.	"P"	"P"	Co Mo	✓
K 3-110	Low temp. shift conv.	Process gas, ex. HTS	"	Tablets	"P"	ZnO, Al_2O_3	Cu	✓
R 1-10	Methanation	Methanation of CO_2, CO	H_2	Tablets	0.9*	Al_2O_3	Ni	✓
DYCAT INTERNATIONAL								
Dycat 140	S removal	Gas, naphtha	S free hydrocarbons	Sph.	70	None	Zno	✓
Dycat 873	High act. steam reforming	Nat. gas LPG, refinery gas, lt. naphtha	H_2, CO, CO_2	Rings	68-70	α Al_2O_3	Ni, La	✓
Dycat 873F	"	"		Enhanced	64-66	"	"	✓
Dycat 890	"	Naphtha, gas	H_2, CO, CO_2	Rings	68-70	"	"	✓
Dycat 804	Methanation	CO, CO_2		Rings, cyl. sph.	54-56	Refractory	"	✓
Dycat 812		Secondary reforming	Process gas, NH_3 prod.	Rings	72	α Al_2O_3	"	✓
HALDER TOPSOE								
RKS-1	Medium act. steam reforming	Lt. to hvy. NG and ref. gas.	H_2, CO, CO_2	Rings	62-65	$MgAl_2O_4$	Ni	✓

(Continued)

Steam hydrocarbon reforming catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agent	Availability
R-67	High act. steam reforming	C_1-C_4 hydro. carbon, ref. gas	"	"	65-68	Mg Al_2O_4	Ni	✓
R-67-7H	"	"	"	Cyl. with holes	53-56	"	"	✓
RKNR	"	CH_4, LPG, naphtha, lt., hvy. offgas	"	Rings	57-60	MgO, Al_2O_3	"	L
HTZ-3	Fine desulf. of steam reforming, feed	CH_4, LPG, naphtha ref. gas	S free hydrocarbon	Ext.	78	—	ZnO	✓
HTZ-5	"	"	"	"	62	—	"	✓
SK-12	High temperature CO conv.	Steam ref. effluent	Gas, 2-3% CO	Cyl.	65	—	Fe, Cr oxides	✓
LSK	Low temp. CO conv., regen. Cl_2 resist.	HT-shift effluent	Gas, 0.1-0.3% CO	Cyl.	66	—	Cu, Zn, Cr oxides	✓
LK-801	Low temp. CO conv. S resistant	HT-shift effluent	Gas with 0.1-0.3% CO	Cyl.	67	—	Cu, Zn, Al oxides	✓
PK-5	Methanation	H_2, 2% CO + CO_2	H_2 w/o CO, CO_2 O_2 containing contaminants.	Rings	39	Al_2O_3	Ni	✓
ICI CATALYSTS								
41-6	HDS	Gas/naphtha		Ext.	0.6*	Al_2O_3	Co Mo	✓
61-1	"	"		"	0.67*	"	Ni Mo	✓
32-4	S removal	"		Sph.	1.08*	None	ZnO	✓
25-3	"	Heavy gas		"	1.0*	"	Ni K_2O	✓
59-3	Chloride removal	"		"	0.85*	Al_2O_3	Alkali	✓
46-1	Steam reforming	Naphtha		Ring	1.15*		Ni, K_2O	✓
46-4	"	"		"	1.0*	Ca, Al_2O_3	Ni	✓
57-3	"	Nat. gas, ref gas		"	1.0*	"		✓
KATALCO CORP. DIVISION, ICI AMERICAS								
23-1, 23-3	Steam reforming	Nat., refin. gas		Ring	66/75	Al_2O_3	Ni	✓
23-4, 23-4M	"	"		4 hole-ring	66/75	"	Ni	✓
25 Series	"	Hvy nat. gas		Rachig & 4 hole ring	66	Ca Aluminate	Ni/Potash	✓
46-9	"	" & LPGs		Ring	66	"	Ni/Potash	✓
46-1	"	Naphtha		Ring	72		Ni/Potash	✓
46-4	"	Naphtha		Ring	62		Ni	✓
71-1	High temp. shift	Reformer product gas		Cyl.	77	None	Fe, Cr oxides	✓
52-2	Low temp. shift	HT shift product gas		Cyl.	62	None	Cu, Zn, Al_2O_3	✓
53-1	"	"		Cyl.	62	None	"	✓
11-3	Methanation	CO_2 removal plant gas		Cyl.	70	Ca/Aluminate	Ni	✓
11-4	"	"		Cyl.	75	"	Ni	✓
59-3	Chloride removal	Any gas stream		Sph.	55	Alumina	Promoted Al_2O_3	✓
32-4	S removal	"		"	77	None	ZnO	✓
UNITED CATALYSTS INC.								
C11-2, C11-2S	Steam hydrocarbon reforming	Nat. gas-C_3H_3 feed	H_2, 65-72%	Raschig rings	50-55†	Ca Aluminate	Ni	✓
C11-9-01, 02, 03, 04, 06	Composition differs	"	"	Raschig rings	70-95†	Refractory Al_2O_3	Ni	✓
C11-9-09 HGS	"	"	"	"Wheels"	70	"	Ni	✓
G90A, & B, & C	"	"	"	Raschig rings	50-60†	"	Ni	✓
G56A, B, H	"	"	"	Raschig rings	55-60	Ca Aluminate	Ni	✓
C11-9-061	Composition differs	C_4H_{10}-naphtha feeds	H_2, 65-72%	Raschig rings	80-85†	Refractory Al_2O_3	Ni	✓
C11-9-062	"	"	"	Raschig or HGSA	80-85 70 (HGS)	"	Ni	✓
C11-N/C11-NK (split loading)	"	C_4H_{10}-naphtha	"	Raschig ring	67	Refractory	Ni	✓
† Bulk density depends on size of rings and Ni content.								
C7-2	Desulfurization, metal content	NG steam reformer feed	S free streams	Ext.	70	Binder	ZnO	✓
C7-4					80			
G-72D	"	"	"	"	70	"	"	✓
G-1	Conv. of S compounds to H_2S, absorption of H_2S	NG streams	"	Tablats	"P"	"P"	"P"	✓
C12-3-05	High temperature shift conv.	Process gas ex. reformers	CO free gas	Tablets	65	—	Fe/Cr	✓
G3	"	"	"	"	70	—	Fe/Cr	✓
C18 HC	Low temperature shift conv.	Process gas	"	Tablets	80-85	—	Cu	✓
C18-HCS	"	"	"	"	70-80		Cu	✓
G66A	"	"	"	Tablets	80	—	Cu	
G66B	"	"	"	Tablets	90/85	—	"	✓
C13-3	Methanation (differ in form & metal content)	Process gas	H_2 w/o CO, CO_2	Tablets	65	Refractory	Ni	✓
C13-4		"	"	Sph.	55			
C13-5		"	"	"	60	"		

(Continued)

OGJ international refining-catalyst compilation—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
C25-2-02	Co/H_2O shift, H_2S containing gas	Process gas, partial oxidation		Ext., tabs	40-47	Al_2O_3	Co Mo	
G65	Co/H_2O shift H_2S containing gas	Process gas, partial oxidation	″	Tab.	Tablets: 65(T)	Al_2O_3	Co Mo	✓
G65RS	Withstands elevated temp.			Ext., tab.	58(ex) 60(T)			
G87 G87RS	Methanation ″	″	″	Ext. Sph.	60 (ex) 55 (S)	″	″	✓
PROCATALYSE								
MT 15	CO Methanation		Pure H_2	Spheres		Al_2O_3	Ni	✓

Sweetening catalysts

INSTITUTO MEXICANA DEL PETROLEO								
IMP OM-1	Sweet in homogenous phase	LPG, gaso.		Powder	—	—	Co	L
IMP-OM-2	Sweet in heterogenous phase	Gaso., turbine fuel		″	—	—	″	L
UOP INC.								
MEROX FB®	Active agent dispersed in water	Lt. nap. to diesel	Merox®, fixed bet	Liquid slurry		—	"P"	L
MEROX WS®	Active agent dissolved in water	C_1 through LSR, thermal, gaso.	Merox®, liq/liq.	Liquid solution		—	"P"	L
MEROX No. 10®	Active agent supported on activated carbon	Lt. nap. to diesel	Merox®	Granular		Activated carbon	"P"	L
MEROX No. 8®	″	″	″	Granular		Activated carbon	"P"	L
ARI TECHNOLOGIES								
ARI-100, 100 W.S.	Powder (WS-in water soluble bags)	LPG and gaso.	Merox®, Mericat® liq./liq.	Powder		None	"P"	✓
ARI-100L		″	″	Liquid suspen.		None	"P"	✓
ARI-100EXL		″	″	Liquid		None	"P"	✓
ARI-120		LPG, gaso., kero jet	Merox®, fixed bed	Powder		None		✓
ARI-120L		″	″	Liquid slurry		None		✓

Claus unit tail gas treatment catalysts

AKZO CHEMIE/AKZO CHEMIE AMERICA/KETJEN CATALYSTS/NIPPON KETJEN								
KF-124 LD	Co Mo			Cyl.	38	Al_2O_3		✓
KF-124 HD	″			Cyl.	48			✓
KF 165	″			Cyl.	48	″		✓
ALCOA								
S-100 1/8-in.	Subdewpoint Claus tail-gas			Sph.	46	—	None	✓
AMERICAN CYANAMID CO.								
N-25, N-39	(See Unocal "Claus unit listing)							L
HDS-2		Tail gas		Cyl.	~ 36	Al_2O_3	CoO MoO_3	✓
Selectox-33	(See Unocal Claus unit listing)							L
ARI TECHNOLOGIES								
ARI-310	Active ingredient in chelated aqueous solution	Claus tail gas, amine acid gas	Elemental S	Liquid	74.8	None	Iron	L
KAISER CHEMICALS								
S-301, 3 × 6 5 × 8	High porosity, low attrition	Sub-dew point Claus tail gas		Sph.	45	Activated Al_2O_3	Activated Al_2O_3	✓
S-201, 3×6, 5×8	Standard high porosity alumina	Sub-dewpoint Claus tail gas		Sph.	45	Activated Al_2O_3	Activated Al_2O_3	
S-701	Promoted sulfur recovery	High CS_2 and COS conv.	TGCU process	Kloverleaf®	52	"P"	"P"	✓
PROCATALYSE								
TG 103	Total hydrog. of S compounds to H_2S	Claus tail gas	H_2S	Sph.	0.75*	Al_2O_3	CoMo	✓
TG 105	″	″	″	″	″	″	″	✓
RHONE POULENC								
A 2.5	Catalysts for Sulfreen	Claus effluent		Sph.	0.77*	Al_2O_3	—	✓
CRS 31	Oxidation of H_2S to S	″		Ext.	0.95*	TiO_2		✓
AM 2.5	Catalyst protection (Sulfreen units)	″		Sph.	0.82*	Al_2O_3	Fe	✓
SHELL CHEMICAL								
S 099	Incineration of Claus, SCOT tailgas	Claus, SCOT tailgas		Sph.	0.78*	Al_2O_3	—	✓
S 599	Support function, replaces inert ceramic material.	″		Sph.	0.78*	″	—	✓
S 234	Conv. of S compoundst H_2S	Claus tailgas		Cyl.	0.53*	″	Co Mo	✓
S 534	″	″		Sph.	0.77*	″	″	✓

(Continued)

Steam hydrocarbon reforming catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
UNOCAL CORP.								
Selectox-33	Solid for oxidation of H_2S to S, catalytic incineration of SO_2	Claus tail gas, acid		Cyl.	"P"	"P"	Non-noble metals	L
Selectox-32	"	"		Cyl.	"P"	"P"	"	L
N-25	Hydro., hydrolysis of gaseous S compounds	"		Cyl.	"P"	"P"	"P"	L
N-39	"	"		Cyl.	"P"	"P"	"P"	L
N-239	"	"	H_2S	"	"	"	Co Mo	L
UNITED CATALYSTS INC.								
C29-2-02		Claus tail gas		Ext.	37	Al_2O_3	Co Mo	✓
C29-2-03	Stabilized carrier (SC)	"		Ext.	"	"	"	✓
C29-2-04	SC plus lower metals	"		"	"	"	"	✓
C29-3-03	SC plus spherical form (SF)	"		Sph.	55	"	"	✓
C29-3-04	SC, SF, plus lower metals	"		"	50	"	"	✓
C29-4-03	Composition, SC, SF	"		"	55	"	Ni Mo	✓
N-239	(See Unocal Corp., Claus unit Listing)							L
G-41P	COS hydrolysis	High CS_2, COS conv.		Ext.	34-38	Al_2O_3	"P"	✓

Other refining catalysts

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
AMERICAN CYANAMID CO.								
TSR-10	(See Unocal "other listing")							
SOAR-100	"							
Bayer AG OC-1038	Hydrog. & etnerification, condensation, dehydrolization	Methanol & C_5 cracked fraction acetone	Tame MIBK	Beads	1.2*	Polystyrene DVB copolymerisate	Sulfonic acid groups, Pd	L
AC 10FT	Oligomerization	Isobutene	Di & tri-isobutene	Powder	1.3*	"	"	✓
BP								
CDW-12	Producing specialty and lube oils	Dist. raffinates	High quality specialty, lube oil	Cyl.		Zeolite	Noble metal	L
CDW 14	Improving low temp. properties of mid. dist.	Kero. gas oils oils	Jet, kero. diesel, heating oils	Cyl.		Zeolite	Noble metal	L
FF-62	Lube oil color improvement	Solvent refined lube oils	Finished lube oils	Sph.		"P"	"P"	L
CHEVRON RESEARCH CO.								
GC-500	Selective arsine removal	Lt. HC gas	Arsine free feed	Cyl.	34-35	Al_2O_3	"P"	L
GC-501	"	"	"	"	"	"	"	L
ENGELHARD CORP.								
HZ-1®	Gas oil cracking, Houdriflow TTC. HZ-1 is octane catalyst	HGO	Olefins, LPG, LCO	Ext.	0.95*	In situ zeolites	Zeo./No RE	✓
HZ-PLUS®	High attrition resistant	"	"	Ext.	0.95*	"	"	✓
EMCAT®-100	RE exchanged version, max. liquid yield. HCC, TOC xylenes plus	HGO; toluene, mixed C_9 transalky	LPG, gaso. LCO xylene, benezene	Ext.	0.95*	In situ zeolites	Zeo. RE exchanged	✓
EMCAT®-80	Lower activity version	"	"	Ext.	0.95*	"	"	✓
HZ-PLUS P®, EMCAT®-100P and	Prepromoted products for max. CO burning.	HGO cracking	LPG, gaso. LCO	Ext.	0.95*	In situ zeolites	Zeo. No RE HZ-P, RE exch. (EMCAT)	✓
HRD-264	Vapor phase S removal	Naphtha reformer	S-feed naphtha	Ext.	70	Al_2O_3	"P"	✓
HALDOR TOPSOE								
HTZ-3	Fine desulfur. of steam ref. feed reforming feed stocks	Methane, LPG, naphtha, ref. gas	S-free hydrocarbon	Ext.	82		ZnO	✓
HTZ-5	" low temp., low S	"	"	"	62		"	✓
SK-12	High temp. CO conv.	Steam ref. effluent	Gas with 2-3% CO	Cyl.	65		Fe/Cr oxides	✓
LSK	Low temp. CO conv., regenerable, chlorine resistant	HT-shift effluent	Gas with 0.1-0.3% CO	Cyl.	66		Zn, CR oxides	✓
LK-801	Low temp. CO conv., S resistant	"	"	Cyl.	64		Cu, Zn, Al oxides	✓
PK-5	Methanation	H_2 w/o CO, CO_2 containing H_2 with up to 2% contaminants		Rings	39	Al_2O_3	Ni	✓
ICI Catalysts								
32-4	Desulf. of steam ref. feed	CH_4, LPG naphtha ref. gas	S-free hydrocarbons	Sph.	1.08*	None	Zno	✓
75-1	Cold desulf. of hydrocarbons	NG, LPG, naphtha, kero., H_2 off gas, cat. ref	"	Sph.	0.85*	None	Zno	✓
59-3	HCl removal	NG, H_2 off gas, cat. ref.	Chloride-free hydrocarbons	Sph.	0.85*	Al_2O_3	Activated	✓

(Continued)

Other refining catalysts—continued

Catalyst designation	Primary differentiating characteristics	Application (feedstock)	Application (product)	Form	Bulk density compacted, lb/cu ft,* g/cc	Carrier, support	Active agents	Availability
INSTITUTO MEXICANO DEL PETROLEO								
IMP-TPC-1	Cumene production	Benzene, propane propylene	Cumene	Cyl.	0.86-0.95*	—	Fe, K, oxides	L
IMP-ES-1	Styrene production	Ethylbenzene water vapor	Styrene	Cyl.	1.0-1.4*	—	Fe, K, oxides	L
KALI-CHEMIE AG								
KC PERL-KATOR® series	Moving bed cat. cracking in TCC, Houdriflow	Gas oil cracking		Beads		SiO_2/Al_2O_3	Acid sites	L
D 1	Hvy. feeds, gaso. yields secondary	HGO/VGO	C_3/C_4 olefins	Bead	0.80*	SiO_2, Al_2O_3	Amorphous aluminosilicate	✓
D8	Improved yield selectivity more gasoline, less avg gas & coke	"	Gaso. dist.	"	0.90*	"	Stab. zeolites	✓
D9A	High act. version imp. stability	"	"	"	"	"	"	✓
D10A	Max. Co burning in kiln gas	"	"	"	"	"	Stab. zeolites, CO combustion promoter	✓
D11	High octane	HGO/VGO	High oct. gaso.	"	"	"	Stab. zeo.	✓
D12	High gaso. selectivity	"	High oct. gaso., low low coke yields	"	"	"	"	✓
D 14	"	"	High oct. gaso.	"	"	"	"	✓
XP-catalyst	Xylenes-plus process	Transalkylation, disproportionation toluene	Xylenes/benzene	"	"	"	RE exchanged zeo.	L
Beadcat PK series	Xylenes Isom.	Xylenes	p, o-xylene	"	0.8*	"	Acid sites	✓
PROCATALYSE								
RS 103	Oxidation of S compounds	S-H_2S, COS-CS_2, RSH	SO_2	Sph.		Al_2O_3	Metallic oxides	✓
DN 281	NOx reduction	Industrial gas	N_2	Sph.		"	Metallic oxides	✓
FF 62	Lube oil hydrofinishing	Extracted lube	Finished base oil	Sph.		"		L
HR 346	Wax hydrotreating	Slack wax	Food-grade wax	Cyl.		"	Ni-Mo	✓
SHELL CHEMICAL								
S 538	CO/H_2O shift reactions	Treatment of syngas		Sph.	0.82*	Al_2O_3	Co Mo	✓
UNOCAL CORP.								
TSR-10	Trace S removal	Naphthas	Cat. ref. feed	Sh. ext.	"P"	"P"	"P"	L
TSR-11	"	"	"	"	"P"	"P"	"P"	L
SOAR-100	Arsenic removal	Shale oil, coal liq.	Low arsenic prod.	Sh. Ext.	"P"	"P"	"P"	L
UNITED CATALYSTS								
C53-2-01	COS hydrolysis	FCC P-P gas		Ext.	28-32	Al_2O_3	PTS	✓
G-132	Arsine removal	"		Tab	75-85		Cu	✓
C28-1-01	S removal	Naphthas, cat. ref. feed		Ext.	45-50	"P"	"P"	✓
TSR-11	(See Unocal "other" listing)							L
C125-1-01	HCl removal	H_2 offgas cat. ref.		Ext.	47-53	Zn	Ca	✓
G-92	"	"		Sph.	49-55	Al_2O_3	Na	✓
UOP INC.								
TA-4	Transalkylation	Toluene and C_9 aro.	Benzene, xylenes	Cyl.	45	"P"	"P"	Contact UOP
DEH-5	Paraffin dehydro.	C_6-C_{20} paraffins	C_6-C_{20} monoolefins	Sph.	21	Al_2O_3	Pt	"
DEH-6	Light paraffin dehydrog.-	C_3-C_5 paraffins	C_3-C_5 monoolefins	"	21	"	"P"	"
DEH-7	Paraffin dehydrog.	C_6-C_{20} n-paraffins	C_6-C_{20} monoolefins	"	20	"	"	"
A-2	Alkyl. of benzene with ethylene	Ethylene. benzene	Ethylbenzene	Sph.	35	Al_2O_3	"P"	"

Methyl tertiary butyl ether (MTBE) catalysts

BAYER AG								
SPC 118	Ethorification	Methanol, C_4 raffinates		Beads	1.2*	Polystyrene, DVB CO-Polymerisate	Sulfanic acid groups	L

Combustion Promotors (FCC)

Catalyst designation	Primary distinguishing characteristics	Application	Additive to or component of catalyst	Form	Carrier, support	Active agents	Available
AKZO CHEMIE/AKZO CHEMIE AMERICA/KETJEN CATALYSTS							
Ketjen Oxycat Series KOC-50	High oct., stab. attrit. resist.	CO combustion	Add. or blend	Powder	Al_2O_3	Pt	✓
KOC-10	"	"	"	"	"	"	✓
Ketjen Desox-3 KD SOx-3	Attrition resist.	SOx-trans.	Additive	"	"	Pt	✓

(Continued)

Modern FCC manufacturing plant shows modern technology used in making high-quality catalysts. Photo courtesy Harshaw/Filtrol Partnership.

Combustion Promotors (FCC)—continued

Catalyst designation	Primary distinguishing characteristics	Application	Additive to or component of catalyst	Form	Carrier, support	Active agents	Available
AMBUR CHEMICAL CO. INC.							
CCA Brand	Combination of noble metals on active alumina	CO combustion	Additive	MS	High purity Al_2O_3	Pt, Pd	✓
CCA-1®	Highest activity	Partial, complete CO comb.	"	"	"	"	✓
CCA-5+®	High activity	"	"	"	"	"	✓
CCA-6®	High activity/improved support	"	MS	"	"	Al_2O_3	✓
CCA-8®	High act. imp. support	"	"	"	0.97*	Al_2O_3	✓
CATALYSTS & CHEMICALS INDUSTRIES CO. LTD.							
SP-10S	CO combustion solid promoter	FCC feed	Additive	Sph.	Al_2O_3	"P"	✓
DAVISON CHEMICAL DIVISION, W.R. GRACE & CO.							
CP-3	High activity,stability	Partial and complete CO combustion	Additive	MS	"P"	"P"	✓
ENGELHARD CORP.							
COCAT®-1	Low activity	Partial CO comb.	Additive	MS	SiO_2/Al_2O_3	Precious metal	✓
COCAT®-5/ PROCAT 500	High activity	Full CO comb.	Additive	"	"	"	✓
COCAT®-7/ PROCAT 700	High act., imp. support	Full CO combustion	Additive	"	"	"	✓
INTERCAT CORP.							
COP-850 COP-550	Pt. content "	CO combustion	Additive	MS	Al_2O_3	Pt	✓
KATALISTIKS INTERNATIONAL INC.							
KCP-8	High activity comb. CO	Partial, full CO comb. CO	Add. or blend	MS	"P"	Precious metals	✓
KCP-5	Medium activity	"	"	0.80 (ABD)	"P"	"	✓
UOP INC.							
UNICAT® CI-3	Active metal	CO combustion	Additive	Powder	Al_2O_3, Al_2O_3/SiO_2	Pt	✓
W.R. GRACE CATALYSTS PTY. LTD. (See Davison Chemical Division Co. combustion listing)							

Sulfur oxides reduction catalyst (FCC)

Catalyst designation	Characteristics	Form	How introduced to FCC system	
CHEVRON RESEARCH CO.				
Transcat	Fully fluidizable powder	Added to FCC cat.	Separate add. to FCC	
DAVISON CHEMICAL DIV. W. R. GRACE				
Additive R	Additive to reduce regenerator flue gas sox	Additive to FCC cat.	Via separate addition	
ENGELHARD CORP.				
ULTRASOX®	Typical FCC particle	Typical FCC catalyst	As fresh makeup	✓
MAGNASIV® 370S	"	"	"	✓
W.R. GRACE CATALYSTS PTY. LTD. (See Davison Chemical Div. Sox listing)				
KATALISTIKS INTERNATIONAL INC.				
DESOX	Removes SOx from FCC flue gas, releases as H_2S	MS	Added or blended with FCC catalyst.	

REFINING/
PETROCHEMICAL
REPORT

Annual refining survey

Ailleen Cantrell
Director of Editorial Surveys

FOR a better understanding of the survey the following information may be of help.

Calendar-day figures reported in this survey are the average volume a refinery unit processes each day including downtime used for turnarounds. This is actual total volume for the year divided by 365.

Stream-day figures represent the amount a unit can process when running full capacity for short periods.

This survey includes only facilities charging whole crude, plus lube plants not charging whole crude.

Totals. The term NR means not reported. When this term appears in the crude columns, the totals reflect conversion to either a stream-day or calendar-day basis to make each column complete.

Crude conversion factor is 0.95.

In the case of catalytic cracking, if a recycle capacity was not reported, state totals will include a volume that is 30% of the fresh feed reported.

Legend. Hydrocracking includes those processes where 50% or more of the feed is reduced in molecular size; for hydrorefining 10% of the feed or less is reduced in molecular size; and for hydrotreating, essentially no reduction in molecular size of feed occurs.

Values for hydrogen volumes represent either generation or upgrading to 90+ % purity.

Cat reforming definitions are:

- Semiregenerative is characterized by shutdown to the reforming unit at specified intervals or at the operator's convenience for regeneration of catalyst in situ.
- Cyclic is characterized by continuous or continual regeneration of catalyst in situ in any one of several reactors that can be isolated from and returned to the reforming operation. This is accomplished without changing feed rate or octane.
- Other includes: Nonregenerative—catalyst replaced by fresh catalyst; continuous — continuous regeneration of a part of the catalyst in a special regenerator followed by continuous addition to the reactor; moving-bed catalyst systems.

Detailed U.S. breakdown by company, plant, and state starts next page. Included are:

- U.S. crude capacity and downstream production by states.
- Detailed U.S. survey.
- Inactive refineries.

Legend

Numbers identify processes in table

THERMAL PROCESSES
1. Gas-oil cracking
2. Thermal cracking
3. Visbreaking
4. Coking (fluid)
5. Coking (delayed)
6. Other

CAT CRACKING
1. Fluid
2. Other

CAT REFORMING
Semiregenerative:
1. Conventional catalyst
2. Bimetallic catalyst

Cyclic:
3. Conventional catalyst
4. Bimetallic catalyst

Other:
5. Conventional catalyst
6. Bimetallic catalyst

CAT HYDROCRACKING
1. Distillate upgrading
2. Residual upgrading
3. Lube-oil manufacturing
4. Other

CAT HYDROREFINING
1. Residual desulfurizing
2. Heavy gas-oil desulfurizing
3. Cat-cracker and cycle-stock feed pretreatment
4. Middle distillate
5. Other

CAT HYDROTREATING
1. Pretreating cat-reformer feeds
2. Naphtha desulfurizing
3. Naphtha olefin or aromatics saturation
4. Straight-run distillate
5. Other distillate
6. Lube-oil "polishing"
7. Other

ALKYLATION
1. Sulfuric acid
2. Hydrofluoric acid

AROMATICS/ISOMERIZATION
1. BTX
2. Hydrodealkylation
3. Cyclohexane
4. C_4 feed
5. C_5 feed
6. C_5 and C_6 feed

HYDROGEN
1. Steam methane reforming
2. Steam naphtha reforming
3. Partial oxidation
4. Cryogenic
5. Other

NR – not reported

Survey of operating refineries in the U.S. (state capacities as of January 1, 1987)

State	No. plants	Crude capacity b/cd	Crude capacity b/sd	Charge capacity, b/sd: Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Production capacity, b/sd: Alkyla-tion	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Alabama	2	124,500	128,900	34,000	10,000	......	......	27,000	......	13,000	43,500	......	6,000	......	10,500	8.0	400
Alaska	6	225,000	239,093	6,000	......	......	......	12,000	9,000	......	12,000	......	6,500	......	6,000	12.8	......
Arizona	1	5,710	6,000	2,000	......	......	......	......	......	......	......	......	......	......	1,160	......	......
Arkansas	4	64,370	66,800	34,500	......	18,500	775	9,000	......	......	18,000	4,800	......	6,600	11,500	2.8	......
California	28	2,312,593	2,429,449	1,265,765	495,850	616,500	50,900	546,000	377,000	430,000	909,480	108,000	15,800	26,200	72,154	962.4	18,997
Colorado	2	74,750	77,500	30,000	......	24,000	1,000	17,000	......	......	25,500	......	......	......	3,300	......	......
Delaware	1	140,000	150,000	95,000	44,000	60,000	15,000	53,000	19,000	......	110,000	8,000	3,370	......	......	40.0	2,180
Georgia	2	35,000	36,500	......	......	......	......	......	......	......	......	......	......	1,000	26,500	......	......
Hawaii	2	116,000	120,000	68,000	......	22,000	......	12,000	16,000	......	15,500	4,500	1,500	......	1,300	20.1	......
Illinois	7	924,600	981,000	334,150	105,700	339,000	35,600	280,300	66,500	35,000	478,100	86,600	17,300	5,350	36,200	64.3	6,175
Indiana	4	425,800	438,500	232,200	27,500	167,000	12,100	89,000	......	80,000	153,300	33,900	32,500	6,400	45,500	......	1,370
Kansas	7	339,700	355,171	111,000	52,000	127,500	15,950	89,600	3,190	44,000	133,100	36,200	21,969	2,500	6,500	......	2,070
Kentucky	2	218,900	226,300	90,000	57,600	100,000	......	53,500	......	40,000	130,300	12,000	17,400	7,900	30,000	20.0	......
Louisiana	18	2,266,133	2,362,368	898,300	402,300	790,000	51,800	501,000	146,000	265,500	867,600	161,600	65,900	37,900	55,500	162.6	14,035
Michigan	4	120,100	127,094	26,000	......	45,000	1,300	30,000	......	12,500	41,300	9,200	6,000	......	8,650	......	......
Minnesota	2	222,143	229,220	132,000	48,000	78,000	1,000	50,500	......	86,500	125,700	14,400	8,000	......	49,000	20.0	2,500
Mississippi	5	362,300	383,104	287,000	70,000	74,000	7,400	95,800	68,000	189,000	59,800	19,700	5,500	2,000	40,600	215.0	3,450
Montana	5	142,800	149,200	55,250	10,100	50,600	7,700	37,700	4,900	14,000	103,400	11,400	5,400	......	15,500	19.3	435
Nevada	1	4,500	4,700	2,500	......	......	......	......	......	......	......	......	......	......	......	......	......
New Jersey	6	415,000	441,368	235,400	34,500	251,000	37,000	88,500	......	65,000	250,500	17,000	41,000	8,500	73,000	11.0	1,010
New Mexico	3	72,800	77,107	6,000	......	27,200	3,400	16,600	......	......	30,300	3,600	......	......	3,400	......	......
North Dakota	2	62,800	65,400	......	1,500	26,000	5,200	13,000	......	1,200	16,200	3,000	4,500	......	......	......	......
Ohio	4	475,650	499,000	155,000	29,900	171,000	34,800	156,000	86,000	23,000	150,500	25,300	58,400	2,100	19,000	72.0	1,250
Oklahoma	6	387,000	403,815	131,500	27,800	133,500	12,400	97,000	5,000	26,000	139,000	35,400	15,700	9,500	18,300	10.0	1,040
Oregon	1	15,000	15,789	16,000	......	......	......	......	......	......	......	......	......	......	11,500	......	......
Pennsylvania	8	717,200	751,000	319,180	......	266,300	12,300	209,270	51,000	50,000	431,600	44,000	13,450	21,310	33,000	43.5	......
Tennessee	1	57,000	60,000	12,000	......	30,000	......	10,000	......	......	31,000	3,000	......	......	3,500	......	......
Texas	30	4,098,700	4,357,600	1,842,400	369,500	1,605,500	193,650	1,097,600	256,500	900,800	2,220,750	279,600	286,015	99,100	72,400	609.0	12,119
Utah	6	154,500	161,268	45,550	8,500	55,800	9,600	28,500	......	7,100	30,500	11,800	3,750	......	1,700	......	350
Virginia	1	51,000	53,000	29,000	13,500	27,500	2,000	8,750	......	......	24,500	......	......	......	......	......	825
Washington	7	444,225	463,043	218,000	68,000	99,500	20,000	110,800	50,000	25,000	157,500	23,400	2,900	......	16,600	80.0	3,280
West Virginia	2	15,200	15,800	11,350	......	......	......	4,900	4,500	......	5,500	......	......	6,240	......	1.2	......
Wisconsin	1	32,000	34,000	20,500	......	9,700	1,000	8,000	......	5,800	9,000	1,700	......	......	13,500	......	......
Wyoming	6	165,300	170,189	62,600	7,000	63,000	10,200	31,850	......	14,350	51,050	9,850	1,500	1,500	10,500	......	380
Total	187	15,288,274	16,079,278	6,808,145	1,883,250	5,278,100	580,375	3,784,770	1,162,590	2,327,750	6,774,480	967,950	640,354	244,100	696,264	2,374.0	71,866

U.S. refineries: location, capacities, types of processing

			Charge capacity, b/sd								Production capacity, b/sd					
	– Crude capacity –		Vacuum distillation	Thermal operations	— Cat cracking —		Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Company and location	b/cd	b/sd			Fresh feed	Recycle										
ALABAMA																
Hunt Refining Co.—Tuscaloosa	44,500	47,600	14,000	[5]10,000	......	......	[2]6,000	......	[2]9,000 [4]4,000	[1]6,000 [3]1,500	......	......	......	10,500	[1]8.0	400
Louisiana Land & Exploration Co.—Saraland	80,000	81,300	20,000	......	......	......	[2]21,000	......	......	[1]21,000 [7]15,000	......	[6]6,000	......	......	......	......
Total	**124,500**	**128,900**	**34,000**	**10,000**	......	......	**27,000**	......	**13,000**	**43,500**	......	**6,000**	......	**10,500**	**8.0**	**400**
ALASKA																
Atlantic Richfield Co.—Kuparuk	12,000	12,000	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Prudhoe Bay	22,000	22,000	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Chevron U.S.A. Inc.—Kenai	22,000	NR	......	......	......	......	......	......	......	......	......	......	......	6,000	......	......
Mapco Petroleum Inc.—North Pole	90,000	NR	6,000	......	......	......	......	......	......	......	......	[1]2,500	......	......	......	......
Petro Star Inc.—North Pole	7,000	7,200	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Tesoro Petroleum Corp.—Kenai	72,000	80,000	......	......	......	......	[2]12,000	[2]9,000	......	[1]12,000	......	[6]4,000	......	......	[1]12.8	......
Total	**225,000**	**239,093**	**6,000**	......	......	......	**12,000**	**9,000**	......	**12,000**	......	**6,500**	......	**6,000**	**12.8**	......
ARIZONA																
Intermountain Refining Cl—Fredonia	**5,710**	**6,000**	**2,000**	......	......	......	......	......	......	......	......	......	......	**1,160**	......	......
ARKANSAS																
Berry Petroleum Co.—Stevens	3,500	3,800	2,000	......	......	......	......	......	......	......	......	......	......	1,000	......	......
Cross Oil & Refining Co. of Arkansas—Smackover	7,000	7,000	4,000	......	......	......	......	......	......	[6]2,500	......	......	4,000	2,000	[1]2.8	......
Lion Oil Co.—El Dorado[1]	48,000	50,000	25,000	......	[1]18,500	775	[2]9,000	......	......	[1]10,000 [5]5,500	[1]4,800	......	......	6,500	......	......
Macmillan Ring-Free Oil Cl—Norphlet	5,870	6,000	3,500	......	......	......	......	......	......	......	......	......	2,600	2,000	......	......
Total	**64,370**	**66,800**	**34,500**	......	**18,500**	**775**	**9,000**	......	......	**18,000**	**4,800**	......	**6,600**	**11,500**	**2.8**	......
CALIFORNIA																
Anchor Refining Cl—McKittrick	10,000	11,000	7,000	......	......	......	......	......	......	......	......	......	......	......	......	......
Atlantic Richfield Co.—Carson	216,000	225,000	112,000	[5]56,000	[1]75,000	None	[2]45,000	[1]22,000	......	[1]40,000 [4]8,000 [5]6,000 [7]80,000	[1]9,000 *2,400	......	......	......	[1]70.0	2,500
Beacon Oil Co.—Hanford	17,300	19,100	......	[1-3]3,150 [2-3]2,700	......	......	[2]3,600	......	......	......	......	......	......	......	......	......
Champlin Petroleum Co.—Wilmington	61,000	65,000	35,000	[5]24,000	[1]38,000	NR	[5]14,500	......	[3]40,000	[1]15,000	[2]10,500	[4]9,000	......	......	......	1,200
Chevron U.S.A. Inc.—El Segundo	405,000	NR	179,000	[5]54,000	[1]60,000	None	[2]60,000	[1]43,000	[1]24,000 [2]60,000 [4]14,000	[1]56,000 [4]18,000	[1]8,000	[1]1,500	......	......	[2]112.0 [3]55.0	2,900
Richmond[1]	365,000	NR	175,000	......	[1]63,000	None	[2]84,000	[1]77,500 [2]30,000	[2]60,000 [4]65,000	[1]82,000 [5]18,200	[1]9,200	[4]2,100	11,800	11,000	[1]135.0	......
Conoco Inc.—Santa Maria	9,500	10,000	7,800	......	......	......	......	......	......	......	......	......	......	6,800	......	......

Solvent extraction: [1]5,500 b/d.

Company and location	Crude capacity		Charge capacity, b/sd								Production capacity, b/sd					
	b/cd	b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Edgington Oil Cl—Long Beach	41,600	44,730	21,165	......	......	......	......	......	......	......	......	......	......	15,554	......	......
Exxon Co.—Benicia	120,500	124,000	61,000	^{4}27,500	^{1}62,000	11,000	^{3}28,000	^{1}29,500	^{2}37,000	^{1}22,500 ^{2}22,000 ^{4}12,500 ^{5}12,500 ^{7}13,000	^{1}13,000	......	......	......	^{1}104.0	1,100
Fletcher Oil & Refining Co.—Carson	29,500	30,500	......	......	^{1}10,000	1,000	^{2}4,200	......	^{2}10,000	^{1}4,200	......	......	......	......	......	......
Golden Bear Division, Witco Chemical Corp.—Oildale	10,818	11,500	11,500	......	......	......	......	......	......	^{6}780	......	......	4,800	3,300	......	......
Golden West Refining Co.—Santa Fe Springs	40,600	42,300	25,000	^{3}13,800	^{1}13,500	None	^{2}19,000	^{1}11,000	......	^{1}12,000	^{2}3,000	......	......	4,000	^{1}11.0	......
Huntway Refining Co.—Benicia	8,400	9,000	7,500	......	......	......	......	......	......	......	......	......	......	4,500	......	......
Wilmington	5,500	6,000	5,000	......	......	......	......	......	......	......	......	......	......	3,500	......	......
Kern County Refinery Inc.—Bakersfield	20,000	22,000	......	^{2}7,000	......	......	^{2}3,000	......	......	^{1}4,500	......	......	......	......	......	......
Macmillan Ring-Free Oil Cl—Signal Hill	13,000	14,300	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Mobil Oil Corp.—Torrance	123,000	130,000	95,000	^{5}48,000	^{1}63,000	None	^{2}36,000	^{1}21,700	......	^{1}21,000 ^{3}16,000 ^{4}28,000	^{2}12,300	......	......	......	^{1}62.0	2,900
Newhall Refining Cl—Newhall	21,400	23,000	9,000	......	......	......	^{1}2,300	......	^{2}5,000	^{1}3,000	......	......	......	4,500	......	......
Oxnard Refinery—Oxnard	NR	4,500	......	......	......	......	......	......	......	......	......	......	......	3,000	......	......
Pacific Refining Co.—Hercules	55,000	NR	17,000	^{3}12,000	......	......	^{2}15,000	^{1}3,500	......	^{1}15,000	......	......	......	......	......	......
San Joaquin Refining Cl—Bakersfield	18,000	20,000	14,000	^{3}10,000	......	......	......	......	......	......	......	......	......	5,000	......	......
Shell Oil Co.—Martinez	135,200	138,000	92,000	^{4}22,000	^{1}67,000	1,000	^{3}27,000	^{1}27,000	^{3}50,000	^{2}17,000 ^{3}16,000 ^{5}17,000 ^{6}6,300 ^{7}15,000	^{1}8,000	^{1}3,200	4,500	11,000	^{1}110.0	127
Wilmington	117,000	122,000	66,000	^{5}55,000	^{1}35,000	NR	^{2}24,000	......	......	^{2}25,000 ^{3}13,000 ^{5}38,000 ^{7}34,000	^{1}8,600	......	......	......	^{1}36.0	2,500
Texaco Refining & Marketing Inc.—Bakersfield	38,000	42,000	22,000	......	......	......	^{2}23,000	^{1}14,300	^{2}15,000	^{1}12,000	......	......	......	......	^{1}20.0	......
Wilmington	75,000	78,400	42,000	^{5}48,000	^{1}28,000	8,000	^{2}35,000	^{1}20,000	......	^{1}18,000	^{1}4,400	......	......	......	^{3}48.0	1,650
Tosco Corp.—Martinez	126,000	132,600	105,000	^{4}42,000	^{1}55,000	1,000	^{2}20,000 ^{6}23,000	^{1}23,000	^{3}50,000	^{1}13,500 ^{4}28,000	^{1}12,000	......	......	......	^{1}80.0	1,600
Unocal Corp.—Los Angeles	108,000	111,000	83,000	^{3}20,000	^{1}47,000	7,000	^{2}52,000	^{1}22,000	......	^{1}54,000 ^{5}36,000	^{1}10,000	......	......	......	^{1}49.4	......
Rodeo	118,000	125,100	73,800	^{5}50,700	......	......	^{2}28,000	^{1}32,500	......	^{1}23,000 ^{5}9,500 ^{7}14,000	......	......	5,100	......	^{1}70.0	2,620
Total	**2,312,593**	**2,429,449**	**1,265,765**	**495,850**	**616,500**	**50,900**	**546,600**	**377,000**	**430,000**	**909,480**	**108,000**	**15,800**	**26,200**	**72,154**	**962.4**	**18,997**

Solvent extraction: ^{1}50,000 b/sd.

COLORADO

Asamera Oil U.S. Inc.—Commerce City	NR	35,000	17,000	......	^{1}9,000	None	^{2}10,000	......	......	^{2}10,000	*3,000	......	......	......	......	......
Conoco Inc.—Commerce City	41,500	42,500	13,000	......	^{1}15,000	1,000	^{2}7,000	......	......	^{1}7,000 ^{4}8,500	*2,000	......	......	3,300	......	......
Total	**74,750**	**77,500**	**30,000**	......	**24,000**	**1,000**	**17,000**	......	......	**25,500**	......	......	......	**3,300**	......	......

Company and location	Crude capacity		Charge capacity, b/sd								Production capacity, b/sd				Hydrogen (MMcfd)	Coke (t/d)
	b/cd	b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt		
DELAWARE																
Texaco Refining and Marketing Inc.—Delaware City	140,000	150,000	95,000	[4]44,000	[1]60,000	15,000	[2]18,000 [6]35,000	[4]19,000	......	[1]55,000 [4]55,000	[1]8,000 *5,500	[1]2,900 [2]470	......	......	[1]40.0	2,180
Total	**140,000**	**150,000**	**95,000**	**44,000**	**60,000**	**15,000**	**53,000**	**19,000**	......	**110,000**	**8,000**	**3,370**	......	......	**40.0**	**2,180**
GEORGIA																
Amoco Oil Co.—Savannah	28,000	30,000	......	......	......	......	......	......	......	......	......	......	......	22,500	......	......
Young Refining Corp.—Douglasville	7,000	6,500	......	......	......	......	......	......	......	......	......	......	1,000	4,000	......	......
Total	**35,000**	**36,500**	......	......	......	......	......	......	......	......	......	......	**1,000**	**26,500**	......	......
HAWAII																
Chevron U.S.A. Inc.—Barber's Point	48,000	NR	28,000	......	[1]22,000	None	......	......	......	[3]3,500	[1]4,500	[4]1,500	......	1,300	[1]2.5	......
Hawaiian Independent Refinery Inc.—Ewa Beach	68,000	70,000	40,000	......	......	......	[2]12,000	[1]16,000	......	[1]12,000	......	......	......	......	[1]17.6	......
Total	**116,000**	**120,000**	**68,000**	......	**22,000**	......	**12,000**	**16,000**	......	**15,500**	**4,500**	**1,500**	......	**1,300**	**20.1**	......
ILLINOIS																
Calumet Industries Inc.—Burnham	...	...	750	......	......	......	......	......	......	......	......	......	750	......	......	......
Clark Oil & Refining Corp.—Blue Island	64,600	68,000	......	......	[1]25,000	1,000	[2]30,500	[1]11,000	......	[1]20,500	[2]6,000	......	......	4,500	......	......
Hartford	60,000	65,000	18,000	[5]14,500	[1]26,000	1,000	[2]12,000	......	......	[1]12,000 [4]4,000 [5]8,000	[2]8,000	......	......	......	......	750
Marathon Petroleum Co.—Robinson	195,000	205,000	62,000	[3]4,000 [5]24,000	[1]38,000	400	[4]35,000 [6]30,000	[1]22,000	[5]6,000	[1]22,000	[2]7,600	[6]10,000	......	......	[1]25.0	1,200
Mobil Oil Corp.—Joliet	180,000	200,000	88,000	[5]35,000	[1]98,000	None	[2]46,000	......	......	[1]72,000 [2]9,000 [5]75,000	[2]25,000	......	......	......	......	2,225
Shell Oil Co.—Wood River	274,000	286,000	105,500	......	[1]94,000	NR	[2]22,000 [3]75,000	[1]33,500	[3]29,000	[2]64,000 [5]52,500 [6]7,000 [7]35,000	[1]22,000	[1]3,800	4,600	28,500	[1]28.3	......
Unocal Corp.—Lemont	151,000	157,000	59,900	[5]28,200	[1]58,000	5,000	[2]29,800	......	......	[1]29,800 [2]14,200 [3]8,000 [5]39,000 [7]1,800 [7]4,300	[2]18,000	[1]3,500	......	3,200	[1]11.0	2,000
Total	**924,600**	**981,000**	**334,150**	**105,700**	**339,000**	**35,800**	**280,300**	**66,500**	**35,000**	**478,100**	**86,600**	**17,300**	**5,350**	**36,200**	**64.3**	**6,175**
INDIANA																
Amoco Oil Co.—Whiting	350,000	360,000	203,000	[5]27,500	[1]140,000	4,000	[3]75,000	......	[3]80,000	[1]87,000 [5]42,000 [6]4,300	[1]26,000	[1]13,000 [6]18,000	6,400	40,000	......	1,370
Indiana Farm Bureau Cooperative Association Inc.—Mt. Vernon	20,600	21,500	7,200	......	[1]7,000	NR	[2]4,000	......	......	[2]6,000	[2]1,700	[6]1,500	......	......	......	......

Company and location	Crude capacity		Charge capacity, b/sd								Production capacity, b/sd					
	b/cd	b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Rock Island Refining Corp.—Indianapolis^{1}	45,700	47,000	17,000	......	^{1}20,000	NR	^{2}10,000	......	......	^{2}14,000	^{2}6,200	......	......	2,000	......	......
Young Refining Corp.—Laketon	9,500	10,000	5,000	......	......	......	......	......	......	......	......	......	......	3,500	......	......
Total	**425,800**	**438,500**	**232,200**	**27,500**	**167,000**	**12,100**	**89,000**	......	**80,000**	**153,300**	**33,900**	**32,500**	**6,400**	**45,500**	......	**1,370**

Solvent extraction: ^{1}4,500.

KANSAS

Company and location	Crude capacity b/cd	Crude capacity b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Derby Refining Co.—El Dorado^{1}	28,000	NR	10,000	......	^{1}14,500	NR	^{2}5,000	......	......	^{1}5,500	^{1}3,200	......	......	2,500	......	......
Wichita	28,800	NR	10,000	^{5}5,000	^{1}17,000	NR	^{2}7,000	......	......	^{1}7,000	^{1}3,000 *1,500	......	......	......	......	210
Farmland Industries Inc.—Coffeyville	56,500	60,723	19,500	^{5}12,000	^{1}23,000	1,500	^{2}16,000	......	......	^{1}26,500	^{2}6,000	^{6}8,000	2,500	......	......	600
Phillipsburg	26,400	27,460	10,000	......	......	......	^{1}5,300	......	......	^{1}7,500	......	......	......	2,000	......	......
National Cooperative Refinery Association—McPherson	70,000	73,000	27,000	^{5}22,000	^{1}20,000	1,000	^{2}15,000	......	......	^{1}10,000 ^{2}14,000 ^{5}13,000	^{2}6,000	^{4}2,000 ^{6}9,000	......	......	......	650
Texaco Refining & Marketing Inc.—El Dorado	80,000	82,000	27,000	^{5}13,000	^{1}34,000	4,000	^{2}25,000	......	^{3}44,000	^{1}28,500 ^{2}4,800	^{2}12,500	^{1}2,969	......	......	......	610
Total Petroleum Inc.—Arkansas City	50,000	52,200	7,500	......	^{1}19,000	None	^{2}16,300	^{1}3,190	......	^{1}16,300	^{2}5,500	......	......	2,000	......	......
Total	**339,700**	**355,171**	**111,000**	**52,000**	**127,500**	**15,950**	**89,600**	**3,190**	**44,000**	**133,100**	**36,200**	**21,969**	**2,500**	**6,500**	......	**2,070**

Solvent extraction: ^{1}4,500 b/sd.

KENTUCKY

Company and location	Crude capacity b/cd	Crude capacity b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Ashland Petroleum Co.—Catlettsburg^{1}	213,400	220,000	90,000	^{2}2,600 †^{6}55,000	^{1}60,000 §40,000	......	^{2}25,500 ^{6}27,000	......	^{3}40,000	^{1}60,000 ^{2}6,000 ^{3}6,000 ^{4}40,000 ^{7}5,000 ^{7}12,000	^{2}12,000 *1,000	^{1}5,400 ^{6}12,000	7,900	30,000	^{1}20.0	......
Somerset Refinery Inc.—Somerset	5,500	6,300	......	......	......	......	^{4}1,000	......	......	^{1}1,300	......	......	......	......	......	......
Total	**218,900**	**226,300**	**90,000**	**57,600**	**100,000**	......	**53,500**	......	**40,000**	**130,300**	**12,000**	**17,400**	**7,900**	**30,000**	**20.0**	......

Solvent extraction: ^{1}10,000 b/sd. †ART. §Reduced crude converter.

LOUISIANA

Company and location	Crude capacity b/cd	Crude capacity b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Atlas Processing Co., Division of Pennzoil—Shreveport	46,200	50,000	24,300	......	......	......	^{2}10,000	......	......	^{1}10,000 ^{6}3,400 ^{7}1,200 ^{7}5,500	......	......	8,500	600	^{1}6.1	......
BP Oil Inc.—Belle Chasse	NR	205,000	73,000	^{5}21,000	^{1}89,000	2,300	^{2}37,500	......	......	^{2}42,000 ^{4}24,000 ^{5}22,000	^{2}28,400	^{1}24,000 ^{2}6,300	......	......	......	845
Calcasieu Refining Co.—Lake Charles	13,500	NR	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Calumet Refining Co.—Princeton	4,100	4,400	8,000	......	......	......	......	......	......	......	......	......	3,000	1,000	......	......
Canal Refining Co.—Church Point	7,858	7,858	......	......	......	......	^{1}1,600	......	......	......	......	......	......	......	......	......
Citgo Petroleum Corp.—Lake Charles	320,000	330,000	83,000	^{5}63,000	^{1}150,000	None	^{2}46,000 ^{5}45,000	^{1}37,000	^{3}40,000	^{1}91,000 ^{4}14,000	^{1}20,200	......	9,000	......	......	3,000
Claiborne Gasoline Co.—Lisbon	NR	7,500	......	......	......	......	^{2}2.000	......	......	......	......	^{6}1,500	......	......	......	......

	– Crude capacity –		— Charge capacity, b/sd —								— Production capacity, b/sd —					
					— Cat cracking —											
Company and location	b/cd	b/sd	Vacuum distillation	Thermal operations	Fresh feed	Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Conoco Inc.—Lake Charles	156,500	164,000	63,000	[2]12,000 [5]48,800	[1]36,000	None	[2]15,400 [5]12,000	......	......	[1]33,000 [4]44,000 [5]44,000 [7]13,500	[1]6,000 *2,100	......	......	......	......	3,160
Cotton Valley Refinery (Kerr-McGee Refining Corp.)—Cotton Valley	7,800	8,500	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Exxon Co.—Baton Rouge	455,000	474,000	205,000	[5]90,000	[1]155,000	None	[4]95,000	[1]24,000	......	[1]95,000 [3]2,500 [5]55,000 [6]17,000 [7]2,000	[1]29,800 *8,000	......	17,400	28,900	......	4,480
Hill Petroleum Co.—Krotz Springs	55,300	57,500	24,000	......	[1]28,000	None	[2]12,500	......	......	[1]12,500	......	......	......	......	......	......
St. Rose	33,000	34,000	18,000	......	......	......	......	......	......	......	......	......	......	......	......	......
Marathon Petroleum Co.—Garyville	255,000	263,000	125,000	......	[1]75,000	14,000	[6]50,000	......	[2]58,000 [4]35,500	[1]45,000	[2]20,000	[4]15,100 [6]12,000	......	25,000	......	......
Murphy Oil USA Inc.—Meraux[1]	92,500	95,400	40,000	......	[1]35,000	2,500	[6]23,000	......	......	[1]29,000 [4]15,000	[1]8,700	......	......	......	......	......
Placid Refining Co.—Port Allen[2]	NR	50,000	20,000	......	[1]17,000	3,000	[2]10,000	......	......	[1]10,000	[2]3,500	......	......	......	......	......
Shell Oil Co.—Norco	215,000	220,000	78,000	[5]21,000 [6]17,700 [6]85,800	[1]90,000	10,000	[2]18,000 [3]38,000	[1]35,000	[3]70,000	[2]29,000 [3]28,000	[1]13,500 *9,400	......	......	......	[1]70.0	1,000
Tenneco Oil Co.—Chalmette	130,000	137,000	62,000	[5]31,000	[1]45,000	None	[2]27,000 [5]18,000	[1]15,000	[3]40,000 [4]22,000	[1]38,000	[2]19,000	[1]7,000	......	......	[1]24.0	1,550
Texaco Refining & Marketing Inc.—Convent	225,000	240,000	75,000	[3]12,000	[1]70,000	20,000	[2]40,000	[2]35,000	......	[1]40,000 [4]37,000 [6]65,000	[1]12,500	......	......	......	[3]62.5	......
Total	**2,266,133**	**2,362,368**	**898,300**	**402,300**	**790,000**	**51,800**	**501,000**	**146,000**	**265,500**	**867,600**	**161,600**	**65,900**	**37,900**	**55,500**	**162.6**	**14,035**

Solvent extraction: [1]12,000 b/sd. [2]5,000 b/sd.

MICHIGAN

Crystal Refining Co.—Carson City	4,000	6,200	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Lakeside Refining Co.—Kalamazoo	5,600	NR	......	......	......	......	[1]1,000	......	......	......	......	......	......	......	......	......
Marathon Petroleum Co.—Detroit	68,500	71,000	26,000	......	[1]27,000	1,300	[2]17,000	......	[3]12,500	[1]17,500	[1]4,000	......	......	8,650	......	......
Total Petroleum Inc.—Alma	42,000	44,000	......	......	[1]18,000	None	[2]12,000	......	......	[1]18,000 [4]2,000 [7]3,800	[2]4,200 †1,000	[6]6,000	......	......	......	......
Total	**120,100**	**127,094**	**26,000**	......	**45,000**	**1,300**	**30,000**	......	**12,500**	**41,300**	**9,200**	**6,000**	......	**8,650**	......	......

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†Dimersol.

MINNESOTA

Ashland Petroleum Co.—St. Paul Park	67,143	69,220	32,000	......	[1]23,000	......	[2]24,500	......	[3]23,000	[1]24,500 [4]7,200 [7]8,000	[2]5,900 *350	[6]8,000	......	14,000	......	......
Koch Refining Co.—Rosemount	155,000	160,000	100,000	[5]48,000	[1]55,000	1,000	[6]26,000	......	[3]63,500	[1]26,000 [4]46,000 [6]14,000	[1]8,500 *1,100 †3,700	......	......	35,000	[2]20.0	2,500
Total	**222,143**	**229,220**	**132,000**	**48,000**	**78,000**	**1,000**	**50,500**	......	**86,500**	**125,700**	**14,400**	**8,000**	......	**49,000**	**20.0**	**2,500**

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†Dimersol.

	– Crude capacity –		Charge capacity, b/sd								Production capacity, b/sd					
Company and location	b/cd	b/sd	Vacuum distillation	Thermal operations	— Cat cracking — Fresh feed	Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
MISSISSIPPI																
Amerada-Hess Corp.—Purvis	30,000	NR	20,000	[4]8,000	[2]18,000	NR	[2]5,800	......	......	[2]5,800 [4]6,000	[1]3,500	......	......	......	......	250
Chevron U.S.A. Inc.—Pascagoula	295,000	NR	243,000	[5]62,000	[1]56,000	2,000	[2]90,000	[1]68,000	[1]96,000 [3]63,000 [4]30,000	[1]48,000	[1]16,200	[1]5,500	......	20,000	[1]215.0	3,200
Ergon Refining Inc.—Vicksburg	20,500	22,000	17,000	......	......	......	......	......	......	......	......	......	2,000	12,000	......	......
Southland Oil Co.—Lumberton	5,800	6,500	......	......	......	......	......	......	......	......	......	......	......	3,500	......	......
Sandersville	11,000	12,500	7,000	......	......	......	......	......	......	......	......	......	......	5,100	......	......
Total	**362,300**	**383,104**	**287,000**	**70,000**	**74,000**	**7,400**	**95,800**	**68,000**	**189,000**	**59,800**	**19,700**	**5,500**	**2,000**	**40,600**	**215.0**	**3,450**
MONTANA																
Cenex—Laurel[1]	40,400	42,500	14,000	......	[1]12,000	3,000	[2]12,000	......	[4]14,000	[1]15,000	[2]3,000	[4]2,000	......	6,000	......	......
Conoco Inc.—Billings[2]	48,500	50,000	20,000	......	[1]15,500	1,000	[2]12,500	......	......	[4]38,000 [5]3,500	[2]5,000	[4]3,400	......	6,500	......	......
Exxon Co.—Billings	42,000	44,000	18,000	[4]7,700	[1]21,000	3,500	[1]10,000	[1]4,900	......	[2]15,500 [4]10,000 [5]10,000 [7]6,000	[2]3,400	......	......	3,000	[5]19.3	435
Flying J Inc.—Cut Bank	5,600	6,200	......	[2]2,400	......	......	[2]2,200	......	......	[1]2,200 [4]1,000	*500	......	......	......	......	......
Montana Refining Co.—Great Falls	6,300	6,500	3,250	......	[1]2,100	200	[2]1,000	......	......	[1]1,000 [5]1,200	*350	......	......	......	......	......
Total	**142,800**	**149,200**	**55,250**	**10,100**	**50,600**	**7,700**	**37,700**	**4,900**	**14,000**	**103,400**	**11,400**	**5,400**	......	**15,500**	**19.3**	**435**

Solvent extraction: [1]4,000 b/sd. [2]8,500 b/sd (PDA).

	– Crude capacity –		Charge capacity, b/sd								Production capacity, b/sd					
Company and location	b/cd	b/sd	Vacuum distillation	Thermal operations	— Cat cracking — Fresh feed	Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
NEVADA																
Nevada Refining Co.—Tonopah	**4,500**	**4,700**	**2,500**	......	......	......	......	......	......	......	......	......	......	......	......	......
NEW JERSEY																
Amerada-Hess Corp.—Port Reading	......	......	......	......	[1]55,000	None	......	......	......		[1]4,500 *5,000	......	......	......	......	......
Chevron U.S.A. Inc.—Perth Amboy	80,000	85,000	46,000	......	......	......	......	......	......	......	......	......	......	35,000	......	......
Coastal Eagle Point Oil Co.—Westville	90,000	95,000	31,000	[3]13,000	[1]40,000	12,000	[2]38,000	......	......	[1]43,000 [4]30,000	[1]3,000 *2,500	[1]10,000 [2]6,000	......	......	......	......
Exxon Co.—Linden	100,000	110,000	66,000	......	[1]120,000	25,000	[4]27,000	......	[2]50,000	[1]28,000 [2]19,000 [5]65,000	[1]9,500	[6]25,000	......	38,000	......	......
Mobil Oil Corp.—Paulsboro[1]	100,000	104,000	62,400	[5]21,500	[1]36,000	None	[2]23,500	......	[5]15,000	[1]23,500 [4]9,000 [5]33,000 [6]300	[2]5,000	......	8,500	......	[1]11.0	1,010
Seaview Petroleum Inc.—Thorofare	45,000	NR	30,000	......	......	......	......	......	......	......	......	......	......	......	......	......
Total	**415,000**	**441,368**	**235,400**	**34,500**	**251,000**	**37,000**	**88,500**	......	**65,000**	**250,500**	**17,000**	**41,000**	**8,500**	**73,000**	**11.0**	**1,010**

Solvent extraction: [1]9,500 b/sd.

Company and location	– Crude capacity –		Charge capacity, b/sd								Production capacity, b/sd				Hydrogen (MMcfd)	Coke (t/d)
	b/cd	b/sd	Vacuum distillation	Thermal operations	— Cat cracking — Fresh feed	Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt		

NEW MEXICO

Company and location	Crude b/cd	Crude b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Bloomfield Refining Co.—Bloomfield	16,800	18,107	......	......	[1]5,400	500	[2]2,800	......	......	[2]2,800	......	......	......	......	......	......
Giant Industries Inc.—Gallup	18,000	19,000	......	......	[1]7,300	400	[2]6,000	......	......	[1]8,000	[2]1,600	......	......	......	......	......
Navajo Refining Co.—Artesia	NR	40,000	6,000	......	[1]14,500	2,500	[1]1,800 [2]6,000	......	......	[1]10,000 [4]6,500 [5]3,000	[2]2,000	......	......	3,400	......	......
Total	**72,800**	**77,107**	**6,000**	......	**27,200**	**3,400**	**16,600**	......	......	**30,300**	**3,600**	......	......	**3,400**	......	......

NORTH DAKOTA

Company and location	Crude b/cd	Crude b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Amoco Oil Co.—Mandan	58,000	60,000	......	......	[1]26,000	5,200	[4]11,000	......	......	[2]15,000	[2]3,000 *1,700	[6]4,000	......	......	......	......
Flying J Inc.—Williston	4,800	5,400	......	[2]1,500	......	......	[2]2,000	......	[4]1,200	[1]1,200	......	[6]500	......	......	......	......
Total	**62,800**	**65,400**	......	**1,500**	**26,000**	**5,200**	**13,000**	......	**1,200**	**16,200**	**3,000**	**4,500**	......	......	......	......

OHIO

Company and location	Crude b/cd	Crude b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Ashland Petroleum Co.—Canton	66,000	68,000	33,000	......	[1]25,000	NR	[6]20,000	......	[3]23,000	[1]20,000 [4]7,000	[2]7,000 *500	......	......	12,000	......	......
Standard Oil Co. of Ohio—Lima	NR	180,000	51,000	[5]16,200	[1]36,000	7,800	[4]53,000	[4]23,000	......	[1]59,000	......	[1]24,400 [2]6,500 [6]16,600	2,100	......	......	620
Toledo	NR	127,000	49,000	[5]13,700	[1]55,000	16,500	[3]23,000 [4]19,000	[4]35,000	......	[1]37,000	[1]11,300	......	......	7,000	[1]24.0	630
Sun CI-Toledo[1]	118,000	124,000	22,000	......	[1]55,000	3,000	[2]41,000	[1]28,000	......	[1]27,500	[1]7,000	[1]8,500 [2]2,400	......	......	[1]48.0	......
Total	**475,650**	**499,000**	**155,000**	**29,900**	**171,000**	**34,800**	**156,000**	**86,000**	**23,000**	**150,500**	**25,300**	**58,400**	**2,100**	**19,000**	**72.0**	**1,250**

Solvent extraction: [1]11,000 b/sd.

OKLAHOMA

Company and location	Crude b/cd	Crude b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Barrett Refining Corp.—Thomas	13,000	NR	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Conoco Inc.—Ponca City	134,000	138,000	40,000	[5]20,500	[1]45,000	None	[2]33,500	......	......	[1]33,500 [5]24,000	[2]12,000 *2,100	[4]4,500	2,000	......	......	740
Kerr-McGee Refining Corp.—Wynnewood[1]	43,000	45,000	13,000	......	[1]20,000	NR	[2]8,500	[1]5,000	[2]6,000	[1]9,000	[2]5,000	......	......	5,000	[1]10.0	......
Sinclair Oil Corp.—Tulsa	50,000	NR	15,000	......	[1]18,000	5,000	[2]20,000	......	......	[1]20,000	[1]3,000	[4]500	......	2,500	......	......
Sun CI—Tulsa[2]	85,000	90,000	31,500	[5]7,300	[1]28,000	1,400	[2]23,000	......	......	[1]24,000 [6]10,500	[1]2,400 [2]6,000	[1]2,000 [2]1,200 [3]1,500	7,500	4,800	......	300
Total Petroleum Inc.—Ardmore	62,000	64,500	32,000	......	[1]22,500	None	[6]12,000	......	[3]20,000	[1]18,000	[2]7,000	[6]6,000	......	6,000	......	......
Total	**387,000**	**403,815**	**131,500**	**27,800**	**133,500**	**12,400**	**97,000**	**5,000**	**26,000**	**139,000**	**35,400**	**15,700**	**9,500**	**18,300**	**10.0**	**1,040**

Solvent extraction: [1]5,000 b/sd. [2]5,900 b/sd.

OREGON

Company and location	Crude b/cd	Crude b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Chevron U.S.A. Inc.—Portland	**15,000**	**15,789**	**16,000**	......	......	......	......	......	......	......	......	......	......	**11,500**	......	......

PENNSYLVANIA

Company and location	Crude capacity b/cd	Crude capacity b/sd	Charge capacity, b/sd: Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Production capacity, b/sd: Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Atlantic Refining & Marketing Corp.—Philadelphia	125,000	130,000	83,000	......	^{1}29,000	None	^{2}60,000	^{4}30,000	......	^{1}50,000 ^{4}54,000 ^{7}24,000	......	......	......	25,000	^{5}40.0	......
BP Oil Inc.—Marcus Hook	NR	180,000	75,000	......	^{1}50,000	1,600	^{6}48,000	^{4}21,000	^{3}50,000	^{1}64,000 ^{4}22,000 ^{5}22,000	^{2}9,000	......	......	......	......	......
Chevron U.S.A. Inc.—Philadelphia	174,100	180,000	80,000	......	^{1}85,300	6,500	^{2}34,000	......	......	^{2}34,000 ^{4}30,000	^{2}20,000	^{1}4,000 ^{2}1,300	......	......	......	......
Kendall-Amalie Division, Witco Chemical Co.—Bradford	9,900	10,500	......	......	......	......	^{4}3,400	......	......	^{1}3,600	......	......	4,000	......	......	......
Pennzoil Products Co.—Rouseville	15,700	16,500	6,500	......	......	......	^{2}5,820	......	......	^{1}6,500 ^{6}7,800	......	^{6}1,150	4,750	......	^{1}3.5	......
Quaker State Oil Refining Corp.—Smethport^{1}	6,500	7,000	2,680	......	......	......	^{2}2,450	......	......	......	......	......	2,560	......	......	......
Sun Cl—Marcus Hook	155,000	165,000	46,000	......	^{1}82,000	4,000	^{2}39,600	......	......	^{1}54,300 ^{4}14,400 ^{5}13,000 ^{6}6,000	^{1}12,000	^{1}7,000	10,000	......	......	......
United Refining Co.—Warren	60,000	62,000	26,000	......	^{1}20,000	200	^{2}16,000	......	......	^{1}20,000 ^{4}6,000	^{1}3,000 *2,200	......	......	8,000	......	......
Total	**717,200**	**751,000**	**319,180**	......	**266,300**	**12,300**	**209,270**	**51,000**	**50,000**	**431,600**	**44,000**	**13,450**	**21,310**	**33,000**	**43.5**	......

Solvent extraction: ^{1}730 b/sd

TENNESSEE

Company and location	Crude capacity b/cd	Crude capacity b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Mapco Petroleum Inc.—Memphis	NR	60,000	12,000	......	^{1}30,000	None	^{2}10,000	......	......	^{1}10,000 ^{2}5,000 ^{5}16,000	^{2}3,000 *2,500	......	......	3,500	......	......
Total	**57,000**	**60,000**	**12,000**	......	**30,000**	......	**10,000**	......	......	**31,000**	**3,000**	......	......	**3,500**	......	......

TEXAS

Company and location	Crude capacity b/cd	Crude capacity b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Amoco Oil Co.—Texas City	400,000	415,000	195,000	^{5}37,000	^{1}194,000	43,000	^{4}142,000	^{1}55,500 ^{2}60,000	^{3}118,000	^{1}126,000 ^{5}60,000	^{1}19,000 ^{2}23,000	^{1}45,000 ^{6}22,000	......	......	^{1}180.0	2,000
Atlantic Richfield Co.—Houston^{1}	275,000	313,000	136,600	^{5}44,000	^{1}75,000	None	^{2}108,000	......	^{2}48,000 ^{4}48,000 ^{5}37,000 ^{5}800	^{1}108,000 ^{3}8,000 ^{4}42,000 ^{6}12,000	^{1}14,000	^{1}11,000	12,800	......	......	3,500
Champlin Petroleum Co.—Corpus Christi^{2}	155,000	165,000	80,000	^{5}35,000	^{1}77,000	NR	^{5}54,000	......	^{3}55,000 ^{4}40,000	^{1}54,000	^{2}19,000 *1,700	^{1}5,000 ^{3}1,600	......	......	......	1,600
Chevron U.S.A. Inc.—El Paso	76,000	78,000	54,000	......	^{1}22,000	None	^{2}25,000	......	^{4}18,000	^{1}25,000	^{1}5,500	^{4}3,000	......	5,500	......	......
Port Arthur	406,900	418,000	203,200	^{5}34,000	^{1}110,000	6,000	^{2}23,000 ^{4}44,100	......	......	^{2}67,100 ^{4}138,000 ^{6}13,900	^{2}16,900	^{1}4,595 ^{2}2,905 ^{3}2,500 ^{5}7,200	9,000	......	......	1,840
Coastal States Petroleum Co.—Corpus Christi	95,000	NR	53,000	^{3}13,500 ^{5}12,000	^{1}19,500	1,100	^{5}20,000	^{1}10,000	......	^{1}25,000 ^{4}20,000 ^{6}25,000	^{2}2,800	^{1}11,000 ^{2}7,000	......	10,000	^{1}24.0 ^{4}15.0	650
Crown Central Petroleum Corp.—Houston	100,000	105,000	40,000	^{4}12,500	^{1}56,000	NR	^{2}14,000 ^{5}22,000	......	^{4}10,000	^{1}26,000	^{2}13,000	^{1}2,000 ^{2}2,000	......	......	......	350

			Charge capacity, b/sd								Production capacity, b/sd					
	– Crude capacity –				— Cat cracking —											
Company and location	b/cd	b/sd	Vacuum distillation	Thermal operations	Fresh feed	Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Diamond Shamrock Corp.—Sunray[3]	90,000	93,000	47,000	......	^{1}45,000	None	^{2}29,000	......	......	^{1}33,000	^{1}8,700 *4,600	^{4}1,400	......	4,000	......	......
Three Rivers[4]	45,000	47,000	20,000	......	^{1}17,000	None	^{2}8,000	......	......	^{1}9,000	^{2}6,000	......	1,000	......	......	......
El Paso Refining CL—El Paso	21,000	21,000	......	^{5}4,000	^{1}7,000	2,000	^{2}5,600	......	......	^{1}5,600	^{1}2,500 *500	^{4}500	......	......	......	100
Exxon Co. U.S.A.—Baytown[5]	493,000	517,000	258,000	^{6}25,000	^{1}155,000	15,000	^{4}123,000	^{1}19,000	^{2}85,000 ^{3}45,000	^{1}139,000 ^{3}23,500 ^{4}143,000 ^{5}80,000 ^{6}44,100	^{1}29,000	......	36,300	7,000	^{1}85.0	......
Fina Oil & Chemical Co.—Big Spring[6]	NR	60,000	22,000	^{3}3,500	^{1}22,000	None	^{2}20,000	......	......	^{1}22,000 ^{4}14,500 ^{5}3,000	^{2}6,000	......	......	6,500	......	......
Port Arthur[7]	90,000	110,000	40,000	......	^{1}34,000	None	^{5}30,000	......	^{2}18,000 ^{3}13,000	^{1}37,000 ^{5}28,000	^{1}5,000	^{1}10,000 ^{6}8,500	......	2,000	......	......
Hill Petroleum Co.—Houston[8]	NR	70,000	27,000	^{3}7,500	^{1}50,000	NR	^{2}13,500	......	......	^{1}15,000 ^{4}22,500 ^{7}7,500	^{1}5,000	^{1}2,000	......	5,000	......	......
Howell Hydrocarbons Inc.—San Antonio	9,900	10,000	......	......	......	......	^{3}1,200	......	......	......	......	1,200	......	......	......	......
Koch Refining Co.—Corpus Christi	125,000	130,000	40,000	^{4}12,000	^{1}40,000	800	^{1}12,000 ^{3}15,000	......	......	^{1}28,000 ^{5}8,000	^{2}8,400	^{1}7,600 ^{2}2,500	......	......	......	375
LaGloria Oil & Gas Co.—Tyler	65,000	70,000	16,000	^{5}8,000	^{1}17,000	850	^{2}3,500 ^{5}11,700	......	......	^{2}20,800	^{1}4,800	^{6}5,000	......	......	......	300
Liquid Energy Corp.—Bridgeport	10,000	10,800	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Marathon Petroleum Co.—Texas City	69,500	72,000	28,000	......	^{1}38,000	1,000	^{1}8,000	......	......	......	^{2}11,000	^{1}2,500	......	......	......	......
Mobil Oil Corp.—Beaumont	270,000	285,000	86,000	^{5}29,500	^{1}102,000	None	^{2}103,000	^{1}32,000	......	^{1}92,000 ^{5}116,000 ^{6}3,500 ^{7}2,150	^{1}13,000	^{5}20,000	8,300	......	^{1}60.0	1,404
Phillips 66 Co.—Borger	105,000	110,000	......	......	^{1}60,000	10,400	^{2}26,000	......	^{1}50,000 ^{4}40,000	^{2}26,500	^{2}14,000	^{3}3,060 ^{4}8,100 ^{5}12,100 ^{6}12,500	......	......	^{1}50.0	......
Sweeny	175,000	195,000	83,000	......	^{1}87,000	12,000	^{2}36,000	......	^{1}75,000 ^{4}50,000	^{2}53,000	^{2}10,500	^{1}5,575 ^{3}7,630 ^{5}9,100 ^{6}7,800	......	......	^{4}80.0	......
Pride Refining Inc.—Abilene	42,750	45,000	12,500	......	......	......	......	......	......	......	......	......	......	......	......	......
Shell Oil Co.—Deer Park	214,000	225,000	91,000	^{1}55,000 ^{6}18,000	^{1}65,000	5,000	^{2}20,000 ^{3}44,000	^{4}65,000	^{3}45,000	^{2}65,000 ^{3}37,500 ^{6}15,000 ^{7}75,500	^{1}7,800	^{1}19,100	11,200	5,900	^{1}65.0	......
Odessa	28,600	29,500	10,000	......	^{1}11,500	NR	^{1}11,000	......	......	^{2}11,000	^{1}3,000	^{1}350	......	......	......	
Southwestern Refining Cl—Corpus Christi	104,000	108,000	36,000	......	^{1}50,000	None	^{2}30,000	......	^{2}18,000	^{1}40,000 ^{4}27,000	^{2}4,000 *§4,200	^{1}6,500	......	......	......	......
Texaco Refining & Marketing Inc.—Port Arthur and Port Neches	250,000	278,000	143,100	......	^{1}110,000	31,500	^{5}40,000	^{1}15,000	......	^{1}40,000 ^{4}80,000 ^{6}18,500	^{1}9,000	......	17,400	14,000	......	......
Texas City Refining inc.—Texas City	119,600	130,000	54,000	^{3}19,000	^{1}43,500	None	^{1}11,000 ^{5}12,000	......	^{4}29,000	^{1}23,000	^{2}6,200	......	......	......	......	......
Unocal Corp.—(Beaumnont), Nederland	120,000	126,300	43,000	......	^{1}39,000	4,000	^{3}12,000 ^{4}20,000	......	......	^{1}32,000 ^{2}11,000 ^{3}10,600	^{1}4,200 *1,400	^{1}5,000 ^{3}1,200	3,100	2,500	......	......
Valero Refining Co.—Corpus Christi	NR	21,000	24,000	......	†53,000	2,650	......	......	^{1}54,000	^{7}8,000	^{2}8,300 §2,500	......	......	10,000	^{1}50.0	......
Total	**4,098,700**	**4,357,800**	**1,842,400**	**369,500**	**1,605,500**	**193,650**	**1,097,600**	**256,500**	**900,800**	**2,220,750**	**279,600**	**288,015**	**99,100**	**72,400**	**609.0**	**12,119**

Solvent extraction: [1] 10,200 b/sd. [2] 12,000 b/sd. [3] 15,000 b/sd. [4] 7,000 b/sd. [5] 53,000 b/sd. [6] 10,000 b/sd. [7] 18,000 b/sd. [8] 10,000 b/sd. †Heavy oil cracker. §Dimersol.

	Crude capacity		Charge capacity, b/sd								Production capacity, b/sd					
					Cat cracking											
Company and location	b/cd	b/sd	Vacuum distillation	Thermal operations	Fresh feed	Recycle	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
UTAH																
Amoco Oil Co.—Salt Lake City	40,000	41,500	......	......	^{1}18,000	4,000	^{4}6,000	......	......	^{1}6,000	^{1}4,000	^{4}3,000	......	......	......	......
Big West Oil Co.—Salt Lake City	24,000	24,000	3,850	......	^{2}5,400	1,500	^{2}5,000	......	......	^{1}6,000	^{2}1,400	......	......	......	......	......
Chevron U.S.A.—Salt Lake City	45,000	NR	35,500	^{5}8,500	^{1}11,000 ^{2}7,000	None 1,000	^{2}5,500	......	^{4}5,500	^{1}5,500	^{2}4,300	^{4}750	......	......	......	350
Crysen Refining Inc.—Woods Cross	12,500	13,400	3,000	......	......	......	^{2}3,000	......	......	......	......	......	......	......	......	......
Phillips 66 Co.—Woods Cross[1]	25,000	26,000	3,200	......	^{2}8,400	2,600	^{2}6,000	......	^{4}1,600	^{2}11,000	^{2}2,100	......	......	1,700	......	......
Seagull Refining Co.—Roosevelt	8,000	9,000	......	......	^{1}6,000	500	^{2}3,000	......	......	^{4}2,000	*2,500	......	......	......	......	......
Total	**154,500**	**161,266**	**45,550**	**8,500**	**55,600**	**9,600**	**28,500**	......	**7,100**	**30,500**	**11,800**	**3,750**	......	**1,700**	......	**350**
Solvent extraction: ^{1}5,000 b/sd.																
VIRGINIA																
Amoco Oil Co.—Yorktown	51,000	53,000	29,000	^{5}13,500	^{1}27,500	2,000	^{2}8,750	......	......	^{1}9,000 ^{5}15,500	*2,400	......	......	......	......	825
Total	**51,000**	**53,000**	**29,000**	**13,500**	**27,500**	**2,000**	**8,750**	......	......	**24,500**	......	......	......	......	......	**825**
WASHINGTON																
Atlantic Richfield Co.—Ferndale	163,000	170,000	95,000	^{5}50,000	......	......	^{2}50,000	^{1}50,000	^{4}17,000	^{1}32,000	......	......	......	......	^{1}80.0	2,500
Chevron U.S.A. Inc.—Seattle	5,500	NR	6,000	......	......	......	......	......	......	......	......	......	......	5,000	......	......
Mobil Oil Corp.—Ferndale	77,000	79,000	28,000	......	^{2}25,500	2,000	^{4}11,800	......	......	^{1}13,500 ^{4}15,000	^{2}5,900 *1,200	......	......	......	......	......
Shell Oil Co.—Anacortes	77,000	80,000	34,500	......	^{1}39,000	9,000	^{3}22,000	......	^{3}8,000	^{2}22,000 $^{5\text{-}7}$21,000	^{1}10,900	^{4}2,900	......	......	......	......
Sound Refining Inc.—Tacoma	11,900	12,754	6,000	......	......	......	......	......	......	......	......	......	......	3,600	......	......
Texaco Refining & Marketing Inc.—Anacortes[1]	78,000	82,000	30,000	^{5}18,000	^{1}35,000	9,000	^{2}21,000	......	......	^{1}21,000 ^{4}13,000 ^{5}10,000	^{1}6,600 *1,100	......	......	......	......	780
U.S. Oil & Refining Co.—Tacoma	NR	33,500	18,500	......	......	......	^{2}6,000	......	......	^{1}6,000 ^{4}4,000	......	......	......	8,000	......	......
Total	**444,225**	**463,043**	**218,000**	**68,000**	**99,500**	**20,000**	**110,800**	**50,000**	**25,000**	**157,500**	**23,400**	**2,900**	......	**16,600**	**80.0**	**3,280**
Solvent extraction: ^{1}5,000 b/sd.																
WEST VIRGINIA																
Quaker State Oil Refining Corp.—																
Newell	10,500	10,800	8,850	......	......	......	^{2}3,400	^{3}4,500	......	^{2}3,900	......	......	4,440	......	^{1}1.2	......
St. Mary's[1]	4,700	5,000	2,500	......	......	......	^{2}1,500	......	......	^{1}1,600	......	......	1,800	......	......	......
Total	**15,200**	**15,800**	**11,350**	......	......	......	**4,900**	**4,500**	......	**5,500**	......	......	**6,240**	......	**1.2**	......
Solvent extraction: ^{1}800 b/sd.																
WISCONSIN																
Murphy Oil USA Inc.—Superior	**32,000**	**34,000**	**20,500**	......	**^{1}9,700**	**1,000**	**^{2}8,000**	......	**^{4}5,800**	**^{1}9,000**	**^{2}1,700**	......	......	**13,500**	......	......

	Crude capacity	Crude capacity	Charge capacity, b/sd	Charge capacity, b/sd	Charge capacity, b/sd	Charge capacity, b/sd	Charge capacity, b/sd	Charge capacity, b/sd	Charge capacity, b/sd	Charge capacity, b/sd	Production capacity, b/sd	Production capacity, b/sd	Production capacity, b/sd	Production capacity, b/sd		
Company and location	b/cd	b/sd	Vacuum distillation	Thermal operations	Cat cracking Fresh feed	Cat cracking Recycle	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
WYOMING																
Amoco Oil Co.—Casper	40,000	41,000	7,000	......	[1]13,500	2,700	[4]6,000	......	......	[1]7,100	[1]2,300	......	1,500	......	......	......
Frontier Oil & Refining Co.—Cheyenne	35,000	35,500	17,000	[5]7,000	[1]12,000	500	[2]7,000	......	[4]4,350	[1]7,000	[2]2,750	[4]1,500	......	5,500	......	380
Little America Refining Co.—Casper	24,500	NR	8,600	......	[1]12,500	3,000	[2]6,100	......	......	[1]7,200 [2]3,750	*1,500	......	......	......	......	......
Mountaineer Refining Cl—LaBarge	300	400	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Sinclair Oil Corp.—Sinclair	53,000	54,000	30,000	......	[1]21,000	1,000	[1]10,000	......	[3]10,000	[1]14,000 [4]12,000	[1]4,000 *750	......	......	5,000	......	......
Wyoming Refining Co.—Newcastle	12,500	13,500	......	......	[2]4,000	3,000	[1]2,750	......	......	......	[2]800	......	......	......	......	......
Total	**165,300**	**170,189**	**62,600**	**7,000**	**63,000**	**10,200**	**31,850**	......	**14,350**	**51,050**	**9,850**	**1,500**	**1,500**	**10,500**	......	**380**

INACTIVE REFINERIES

1. Amber Refining Co., Fort Worth, Texas—14,500 b/cd.
2. Chevron USA Inc., Bakersfield, Calif.—26,000 b/cd.
3. Chevron USA Inc., Cincinnati, Ohio—43,700 b/cd.
4. Young Refining Co., St. Marks, Florida—17,500 b/cd.

Worldwide Construction

Aileen Cantrell
Director of Editorial Surveys

Major construction projects in worldwide processing and pipelining, showing capacities, contractors, estimated costs, and time of completion. Total capacity figure in "Remarks & completion" column includes capacity of project listed. Where no such figure is given, project listed is a new unit.

Refineries—WORLDWIDE CONSTRUCTION

- * Designates projects listed for the first time in the Journal.

Company and location	Project	Capacity (b/d)	Remarks & completion
UNITED STATES			
Alaska Pacific Refining Inc.—Valdez	New ref	100,000	Eng-design: UOP. $700 MM. 1989.
Amoco Oil—Yorktown, Va.	Ultraformer	1,000	9,500 total cap. Eng: staff. Late 1987.
Arco Petroleum Prod.—Carson, Calif.	Reformer	....	Revamp. Eng: Fluor. Con: Brown & Root. 1987.
Ferndale, Wash.	Reformer	8,000	LPG recover. Eng: RM Parsons. Con: Bechtel. 1987.
Clark Oil & Refining—Hartford, Ill.	Hydrotreat	4,000	Eng: Pritchard. Const: Murphy. Dec. 1987 on all units.
	Isom	4,000	C_5-C_6.
	Hydrogen	2.5 MMcfd	Steam meth reform G-C_4.
*Coastal Eagle Point Oil—Westville, NJ	Crude-vac	110,000	Expan. Eng: Humphreys & Glasgow. 1987.
*Conoco Inc.—Ponca City, Okla.	MTBE	1,000	Under const. 1987.
Diamond Shamrock—Sunray, Tex.	Hydrocracker	20,000	$30 MM. Eng. stage. Parsons. Con: Kellogg. Summer 1988.
Ergon Refining Inc.—Vicksburg, Miss.	Hydrorefine	5,000	Lubes. Staff. Dec. 1987.
	Hydrogen	2.2 MMcfd	Steam meth reform. Staff. Dec. 1987.
Koch Refining—Corpus Christi, Tex.	Hydrotreat	....	Naph. Concat regen. UOP. Con: Litwin. 1988.
Lion Oil—El Dorado, Ark.	Isom	3,000	C_5-C_6. Fluor-UOP. Jan. 1988.
Mapco Petroleum—Memphis, Tenn.	Isom	4,000	C_5-C_6 feed. Lic: UC. Staff. Nov. 1987.
Mobil Oil Corp.—Beaumont, Tex.	Cat reform	....	Upgrade and convert from semi bimcat to contin regen. $30 MM. mid 1989
Torrance, Calif.	Hydrorefine	68,000	Cat cracker-cycle stock pretreat. Kellogg. Late 1988.
	hf Alky	5,200	17,500 total cap. Parsons. Late 1988.
	Hydrogen	75.0 MMcfd	Kellogg. Late 1988.
*Phillips 66—(Sweeny) Old Ocean, Tex.	hf alky	15,500	MW Kellogg. Oct. 1988.
San Joaquin Refining—Bakersfield, Calif.	Lubes	4,000	Texaco. Nov. 1987.
Shell Oil—Dominguez, Calif.	Expan	....	Eng: Santa Fe Braun. 1988.
Wood River, Ill.	Cat dewax	9,000	Badger. 1988.
*Tenneco Oil—Chalmette, La.	Expan	....	Crude, Coker, FCC. Eng. Bechtel. 1988.
ARGENTINA			
Isaura SA—Bahia Blanca	Crude	12,000	24,000 total cap. Eng: Kellogg. Con: McKee. 1988 on all units.
	Vacuum	11,300	New. Kellogg. McKee.
	Visbreak	3,800	New. Kellogg. McKee.
	FCC	6,300	New. Kellogg. McKee.
YPF—La Plata	FCC	28,300	Lic: Ereco. Eng: FW-JGC-Sade. Con: JGC-Sade. 1988.
AUSTRALIA			
*Ampol Refiners Ltd.—Brisbane	Hydrotreat	19,000	Naph. UOP Platforming-CCR.
Southern Cross Refiners Pty.—Port Banython	New ref	7,300	$20 MM. Includes: naph. hydrotreat, cat reform, isom, kero treat. End 1988.
AUSTRIA			
*OeMV AG—Schwechat	Hydrocrack	8,400	Selective. Lic: Unocal. Eng: Lurgi. Mid 1988.
BANGLADESH			
Eastern Refinery—Chittagong	Visbreak	....	Revamp. Eng. Lummus Crest. 1988.

REFINERIES

Company and location	Project	Capacity (b/d)	Remarks & completion
BRAZIL			
Petrobras—			
North Eastern	New ref	124,000	Planning.
Araucária	Hydrocrack	28,400	Resid upgrade. Planning.
	Hydrotreat	28,400	Dist. Staff. 1990.
	Hydrogen	28.0 MMcfd	Fuel gas. Staff. 1990.
Betim, MG	Delay coke	14,200	Staff. 1989.
Canoas, RGS	Crude	108,600	Planning. Staff.
	Vac	54,300	Planning. Staff.
	Hydrotreat	28,400	SR Dist. Staff. 1990.
	Hydrogen	13.2 MMcfd	Fuel gas. Staff. 1990.
Cubatão, SP	Hydrotreat	18,600	SR dist. Staff. 1990.
	Hydrotreat	28,400	Dist. Staff. 1990.
	Hydrogen	16.5 MMcfd	Fuel gas. Staff. 1990
	FCC	40,000	Under const. Lic: Kellogg. Eng: Promon. 1989.
Duque de Caxias	Hydrotreat	28,400	Dist. Staff. 1990.
	Hydrotreat	31,200	SR dist. Staff. 1989.
Mataripe	Crude	94,700	217,100 total cap. Staff. 1989.
	Vac	47,300	106,100 total cap. Staff. 1989.
	Hydrocrack	39,800	Resid upgrade. Planning.
	Solvent extract	22,700	26,100 total cap. Planning.
	Hydrogen	22.3 MMcfd	23.4 total cap. Steam meth. reform. Planning.
Paulínia	Delay coke	14,200	Staff. 1989.
	Delay coke	14,200	Planning.
	FCC	40,000	82,500 total cap. Under const. Lic: Kellogg. Eng: Promon. 1989.
	Hydrocrack	28,400	Resid upgrade. Staff. 1990.
	Hydrotreat	56,900	Dist. Staff. 1990.
	Hydrogen	31.9 MMcfd	Fuel gas. Staff. 1990.
São José dos Campos	Solvent extract	27,300	Eng: Ultratec. Staff. 1998.
CANADA			
Consumers Cooperative— Regina, Sask.	Heavy oil	50,000	Manage-contract: Kilborn-Fluor. $650 MM. Late 1988.
	Delay coke	3,000	10,000 total cap. Oct. 1988.
	FCC	5,000	19,000 total cap. Oct. 1988.
	Hydrocrack	12,000	Eng-procure: PBS. Oct. 1988.
	Hydrocrack	30,000	resid upgrade. Eng-procure: PBS. Oct. 1988.
	Hydrogen	65.0 MMcfd	Steam meth. reform. Oct. 1988.
Husky Oil Operations Ltd.—Lloydminster	Heavy oil	54,000	Hydrocracker and delayed coking. $1.2 billion. Design-eng. complete. Completion: 1991.
New Grade Energy Inc.— Regina, Sask.	ARDS	....	$15 MM. Fluor Canada. 1988.
	Crude	50,000	$650 MM. JV Kilborn/Fluor. 1988.
Petro-Canada— Fort McMurray	Crude	70,000	$4 billion. Planned.
Shell Canada Resources— Montreal East	FCC	....	$80 MM. Resid cracker. Contract: Stone Webster/SNC. Late 1987.
CHINA			
Guangzhou Petrochemical Corp.—Huang Pu, Guangdong	Visbreak	20,000	Shell Soak. Lummus Crest BV. Early 1989.
	FCC	25,000	Resid. Eng stage. Lic: Stone & Webster. 1988.
Nanhai Oil Shenzhen Develop. Service Corp.— Nantou Peninsula, Shenzhen, Guangdong Province	New ref	40,000	$21 MM. Yugoslav contract. Finance: Mutual Oil of America Inc., Reno, Nev.
Sinopec—Changling	FCC	25,000	Resid. Eng. stage. Lic: Stone & Webster. 1988.
Funshun, Liaoning	Alky	2,010	Stratco tech. Turnkey: Bechtel.
*Gao Qiao	Hydrotreat	1,000	Paraffin wax. Technip. 1989.
Huang Pu	Demex	16,000	Vac resid. Design: UOP.
Nanjing	FCC	25,000	Resid. Eng. stage. Lic: Stone & Webster. 1988.
Shengli, Shandong	Alky	1,206	Stratco tech. Turnkey: Bechtel.
Wuhan	FCC	20,000	Revamp under way. Lic: Stone & Webster. 1988.
Qi-Lu, Shandong	Hydrotreat	....	Eng. Lummus Crest. 1988.
Zhenahi	FCC	25,000	Revamp under way. Lic: Stone & Webster. 1987.
*Yangzi Petrochemical Nanjing	Therm crack	20,422	Chiyoda. 1988.
Yanshan Petrochemical Corp.—Yanshan, Beijing	Visbreak	20,000	Shell Soak. Lummus Crest BV. Early 1989.
CHINA, TAIWAN			
Chinese Petroleum Corp.— Kaohsiung	Resid HDS	30,000	Eng. Chiyoda. JGC. Mid 1990.
	hf Alky	2,500	Mid 1992.
	Dimersol	500	Mid 1992.
Ta Lin Pu	Resid crack	25,000	Eng. Kellogg. 1990.
	Hydrogen	35.0 MMcfd	Steam meth. reform. Mid 1990.
Tao-yuan	Resid HDS	15,000	40,680 total cap. Chiyoda. Mid 1990.
	Hydrogen	17.0 MMcfd	Eng: Chiyoda. 1990.
COLOMBIA			
Ecopetrol— Barrancabermeja	Crude	20,000	170,000 total cap. Jan. 1988.
	Vac	15,000	95,000 total cap. Jan. 1988.
COSTA RICA			
*Recope—Limon	Crude	4,000	20,200 total cap. Dec. 1988.
	Vac	800	1,400 total cap. Dec. 1988.
	Asphalt	400	700 total cap.
CZECHOSLOVAKIA			
Bratislava	Hydrocrack	16,000	Eng. Snamprogetti. 1989.
Litvinov, Bohemia	Vac	30,000	Snamprogetti. 1988.
EGYPT			
Alexandria Petroleum.— (El-Mex) Alexandria	Crude	42,500	141,750 total cap. Planning.
Assuit Oil Refining.— Assuit	New ref	86,000	2 stages. Bechtel GB. $350 MM. 1989-2nd stage

REFINERIES

Company and location	Project	Capacity (b/d)	Remarks & completion
Cairo Oil Refining.— Mostorod	Crude	39,700	164,760 total cap. Planning.
El Ameria Oil Refining— El Ameria	Crude	42,500	102,840 total cap. Planning
El Nasr Petroleum— Suez	Crude	125,000	198,450 total cap. Complex planned.
	Vac flash	55,000	
	Visbreak	25,000	
	Hydrocrack	32,000	Resid upgrade.
	Hydrotreat	32,000	
	Hydrogen	40.0 t/y	

FRANCE

Company and location	Project	Capacity (b/d)	Remarks & completion
Elf France—Donges	FCC	5,740	41,640 total cap. 1988.
Grandpuits	FCC	2,100	27,300 total cap. 1987.
	Isom	700	C_4 feed. 1988.
	Cat reform	....	Revamp to low press. 1987.
	Solvent extract	10,600	1988.
Shell Francaise— Berre	FCC	....	Transfer unit from Pauillac. Eng: Foster Wheeler. Completion: 1988.

GERMANY, EAST

Company and location	Project	Capacity (b/d)	Remarks & completion
VE AHB Indus.	Resid cracker	11,006	Under const. TEC. 1988.

GERMANY, WEST

Company and location	Project	Capacity (b/d)	Remarks & completion
*Deutsche Texaco—Grasbrook	Revamp	....	Lube base oil. Lic: Texaco. Eng: Edeleanu. Late 1988.
Heide	Visbreak	16,000	Lic: SIPM. Eng: Edeleanu. 1987.
OMV—Schwechat	Hydrocrack	8,400	Lic: Unocal. Eng: Lurgi. 1988.

GREECE

Company and location	Project	Capacity (b/d)	Remarks & completion
Hellenic Aspropyrgos Refinery—Aspropyrgos	Hydrotreat	9,500	31,500 total cap. Asprofos.
	Hydroref	25,500	Feed treat. Lic: IFP. Eng: FWI.
	Hydroref	9,700	Gas oil desulf. 25,300 total cap. Planned.
	Poly	3,700	C_3 dimersol. Lic: IFP. Eng-Const: Tecnicas Reunidas. 1987.
	Poly	4,300	C_4 dimersol. Lic: IFP. Eng-Const: Tecnicas Reuindas. 1987.
	Isom	7,000	C_5-C_6 feed. Lic: UCC. Eng: Asprofos. 1988.
	LPG sweet	9,600	Lic: UOP. Eng-con: Mannesmann. 1987.
	Gaso treat	15,800	Lic: UOP. Eng-con: Mannesmann. 1987.

HUNGARY

Company and location	Project	Capacity (b/d)	Remarks & completion
Dunai KV— Százhalombatta	hf Alky	2,700	Snamprogetti. Mar. 1988.

INDIA

Company and location	Project	Capacity (b/d)	Remarks & completion
*Cochin Refineries Ltd.— Ambalamugal	Cat reform	5,980	Semi bimcat. EIL over all. Feb. 1989 on all units.
	Hydrotreat	5,980	Feed pretreat.
	Arom	1,940	BTX.
Hindustan Petroleum Corp.— Bombay	FCC	2,000	11,000 total cap. Apr. 1988.
	Lube oils	1,500	Bright stocks. Oct. 1988.
Mangalore	New ref	60,000	Proposed. $225 MM. Birlas 27%, Hindustan 26%.
Indian Oil Corp.— Baroda, Gujarat	Crude	27,000	192,200 total cap. EIL. June 1988.
Mathura	Crude	30,000	150,000 total cap. EIL. Dec. 1987.
Tata-Indianoil Refineries Ltd.—Baholi, (sw of Karnal)	New ref	120,493	$1.1 billion. Approved.

IRAN

Company and location	Project	Capacity (b/d)	Remarks & completion
NIOC.—Bandar Abbas (Strait of Hormuz)	New ref	220,000	
Esfahan—	Lube complex	3,618	Eng. stage. FW Italiana.
Arak	New ref	200,000	Planned.

ITALY

Company and location	Project	Capacity (b/d)	Remarks & completion
*API—Falconara	Platformer	....	Revamp to low press. 1988.
Esso Italiana—Augusta	Cat reform	11,100	19,100 total cap. Semi bimcat. 1991.
	Hydrotreat	4,200	18,200 total cap. Feed pretreat. 1991.
	Hydrotreat	9,400	35,200 total cap. SR dist. 1989.
IIP—Taranto	Isom	3,650	Design: Union Carbide. Planned.
Irom—Porto Marghera	Cat reform	15,000	Revamp. IFP. TPL. Dec. 1988.
	Visbreak-therm crack	22,000	Snamprogetti. 1989.
	Vacuum	4,000	FW Italiana.
ISAB—Priolo	Cat reform	3,000	37,500 total cap. 1988.
	Hydroref	34,000	88,000 total cap. Mid dist. 1988.
Mediterranea—Milazzo	Hydroref	14,500	Mid dist. 1989.
	Cat reform	12,000	Revamp. Snamprogetti. 1988.
	Hydrodesulf	19,000	Revamp. Snamprogetti. 1988.
Raffineria del Po- Sannazzaro	Visbreak	29,000	Snamprogetti. 1989.
	Isom	8,700	C_5-C_6 feed. Union Carbide. Snamprogetti. 1989.
*Saras—Sarroch	FCC	6,000	69,000 total cap. Feb. 1989.
	Vac	7,500	115,000 total cap. Oct. 1988.
Soc. Energia Montedison— Priolo	Cat reform	1,000	10,000 total cap. Semi bimcat. End 1988.
	Alky	3,600	Stratco tech. End 1988.
Stanic—Livorno	Cat reform	9,000	Cyclic bimcat. UOP. Snamprogetti. 1988.
Tamoil—Cremona	Hydrocrack	5,500	Dewax. Design: BP. Planned. End 1988.
	Hydrogen	3.6 MMcfd	Planned. End 1988.

JAPAN

Company and location	Project	Capacity (b/d)	Remarks & completion
Kyushu Oil CL— Oita	Hydrocrack	8,000	Dist. upgrade. Dec. 1987.
*Taiyo Oil CL— Ehime	Hydrocrack	12,000	TEC. 1988.
	Vac	16,000	20,000 total cap. Chiyoda. July 1988.
*Toa Oil— Kawasaki City	Cat poly	400	Shoseki Eng. July 1988.
	FCC	20,000	Nippon KK. July 1988.

REFINERIES

KOREA

Company and location	Project	Capacity (b/d)	Remarks & completion
Kukdong Oil CL—Daesan	Crude	54,000	Badger and Hyundai. 1988 on all units.
	Vac	31,000	Badger.
	Delay coke	17,500	Badger.
	Cat reform	2,700	Semi bimcat. Badger, Hundai.
	Hydrocrack	20,000	Dist. upgrade. Badger.
	Hydrotreat	6,000	Naph desulf. Badger & Hyundai.
	Hydrotreat	11,000	SR dist. Badger & Hyundai.
	Hydrotreat	1,800	LPG merox. Badger & Hydundai.
	Hydrotreat	6,300	Kero. merox. Badger & Hyundai.
	Hydrogen	54.0 MMcfd	Steam naph. reform. Badger.
	Coke	1,094	Badger.
Kyung In Energy—Inchon	Cat reform	2,400	6,000 total cap. Lummus on all units. Dec. 1988.
	Hydrotreat	2,400	6,000 total cap. Feed pretreat.
	Hydrotreat	1,500	5,500 total cap. SR dist.

KUWAIT

Company and location	Project	Capacity (b/d)	Remarks & completion
Kuwait National Petroleum—Mina Abdulla	Crude	156,200	$2.1 billion. KSFBraun contractor over all. End 1987 on all units.
	Vacuum	127,000	New.
	Hydrotreat	60,000	91,150 total cap. Resid desulf. Lic: Union Oil.
	Hydrotreat	35,000	Kerosine. Lic: IFP.
	Hydrotreat	25,000	Diesel. Lic: IFP.
	Hydrotreat	7,500	Naphtha desulf. Lic: IFP.
	Hydrotreat	3,200	Merox-naphtha.
	Hydrogen	144.0 MMcfd	183.5 MMcfd total cap. Steam methane reform.
	Hydrogen	24.0 MMcfd	H_2 recovery
	Hydrocrack	38,000	Dist. upgrade. Lic: Chevron.
	Delay coke	60,000	Two units. New. Lic: Santa Fe Braun.
	Coke	1,950 t/d	
*Mina Al-Ahmadi	hf Alky	4,500	Feasibility study size.

LIBYA

Company and location	Project	Capacity (b/d)	Remarks & completion
Ras Lanuf Oil & Gas Processing.—Ras Lanuf	Benzene	2,593	End 1987.
	Coke, t/d	606	

MALAYSIA

Company and location	Project	Capacity (b/d)	Remarks & completion
Petroliam Nasional Bhd.—Tanjung Kling, Malacca	New ref.	100,000	Feasibility study revived.

MEXICO

Company and location	Project	Capacity (b/d)	Remarks & completion
Petroleos Mexicanos:			
Cadereyta, Nuevo Leon	Visbreak	50,000	Dec. 1987.
Lazaro Cardenas, Mich.	New ref	200,000	Planned.
	Vacuum	120,000	
	Cat reform	40,000	
	Hydrotreat	40,000	Cat feed pretreat.
	Hydrotreat	16,000	Naphtha desulf
	Hydrotreat	50,000	Distillates.
Minatitlan	Visbreak	50,000	Eng. stage. Staff. 1989.
Salina Cruz	Crude	165,000	Under const. Staff. 1989.
	Crude	165,000	Planned. Staff. 1990.
	Visbreak	50,000	Eng. stage. Staff. 1989.
	Vac	80,000	Under const. Staff. 1989.
	Vac	80,000	Planned. Staff. 1990.
	FCC	40,000	Eng. stage. Staff. 1989.
	Cat reform	30,000	Cyclic bimcat. Eng. stage. Staff. 1989.
	Hydrotreat	86,000	Total capacity 3 units. Eng. stage. Staff. 1989.
Tula	Crude	165,000	Under const. 1987.
	Vac	80,000	Under const. Staff. 1987.
	Cat reform	30,000	Semi bimcat. Eng. stage. 1987.
	Cat reform	30,000	Eng. stage. Staff.
	Hydrotreat	172,000	Total capacity 6 units. Eng stage. Staff.

NETHERLANDS

Company and location	Project	Capacity (b/d)	Remarks & completion
Kuwait Petr. Europoort—Rotterdam	Isom	5,890	Penex/molex. Turnkey: Santa Fe Braun. Mid 1988 on all units
	Naph HDT	24,130	Feed pretreat.
	Platform	20,000	Concat regen.
	Hydrogen	2.0 MMcfd	Press. swing absorp.
Shell Internationale Petr.—Pernis, Rotterdam	Modernize	....	$750 MM over all. Includes Hycon unit (hydrogen conversion), and desulfurizers. Contractor: Lummus Crest BV. Completion: 1990.
*Texaco Netherlands—Pernis	Hydrotreat	8,100	Naph. Eng. Edeleanu. 1988.
	Isom	8,000	Conv. of reformer. Lic: UC (TIP). Eng. Edeleanu. Late 1988
Total—Vlissingen-Oost	Cat reform	2,000	18,000 total cap. Semi bimcat. Badger. 1988.

NIGERIA

Company and location	Project	Capacity (b/d)	Remarks & completion
Nigerian National Petroleum Corp.—			
Alesa Eleme	Naph desulf	7,500	Planned.
Port Harcourt	New ref	150,000	JGC over all. Marubeni, Spie-Batignolles. Nov. 1986 on all units.
	Vac	53,760	
	FCC	40,000	
	Reformer	33,000	UOP. Naph desulf.
	Polymeriz	4,850	IFP C_3. Dimersol.
	Hydrotreat	33,000	UOP. Naphtha
	Hydrotreat	14,500	IFP. Kerosine
	hf alky	7,000	UOP.
	Treater	11,400	Merox.
	Treater	24,000	Merox.
	Isomerizer	3,600	UOP butamer.

NORWAY

Company and location	Project	Capacity (b/d)	Remarks & completion
Rafinor A/S—Mongstad	Crude	55,000	145,000 total cap. $650 MM. Statoil & Foster Wheeler on all units. Dec. 1988.
	FCC	41,000	Eng: UOP.
	Cat reform	16,000	Contin conven.
	Hydrotreat	16,000	26,000 total cap. Naphtha desulf. UOP lic.
	Hydrotreat	9,000	25,000 total cap. Distillates. Union lic.
	Cat poly	12,000	

REFINERIES

PERU

Company and location	Project	Capacity (b/d)	Remarks & completion
Petroleos del Peru—			
Conchan	Crude	3,700	9,990 total cap. Staff. 1992.
Iquitos	Crude	1,500	11,360 total cap. Staff. 1994.
La Pampilla	Vacuum	42,000	53,090 total cap. Lic: UOP. 1991.
	Visbreak	31,000	New. Lic: UOP. 1991.
	FCC	1,300	7,530 total cap. Staff. 1987.
	FCC	15,000	New. Lic: UOP. 1995.
Pucalipa	Crude	1,150	3,590 total cap. Staff. 1994.
Talara	Crude	10,000	71,030 total cap. Bidding. 1989.
	Vac	12,000	34,180 total cap. Bidding. 1989.
	FCC	5,000	20,440 total cap. Bidding. 1989.

QATAR

Company and location	Project	Capacity (b/d)	Remarks & completion
*National Oil Distributioin.—			
Umm Said	Isom	6,600	Penex-Molex. Eng. stage. 1989.
	Crude	1,200	62,000 total cap. Revamp hydrotreaters, Platformer (concat regen), gas treater, LPG recover. Design: UOP. 1989.

SAUDI ARABIA

Company and location	Project	Capacity (b/d)	Remarks & completion
*Petromin Petrola—			
Rabigh	Atm. dist.	325,000	Snamprogetti. 1988.

SPAIN

Company and location	Project	Capacity (b/d)	Remarks & completion
Lubricates Esso—			
Barcelona	Lube plant	301	100 b/d grease. Eng. stage. Tecnicas Reunidas. Completion: 1988.
*Petronor—Bilbao	Modernize	....	$90MM.
Union Explosivos Rio Tinto—			
La Rabida	Visbreak	10,000	IFP, Foster Wheeler. 1987.

SRI LANKA

Company and location	Project	Capacity (b/d)	Remarks & completion
Ceylon Petroleum—			
Sapugaskanda	Vacuum	1,140	3,040 total cap.Early 1988.
	SR asphalt	570	1,520 total cap.Early 1988.

SWEDEN

Company and location	Project	Capacity (b/d)	Remarks & completion
AB Nynas Petroleum—			
Nynaeshamn	Hydrotreat	2,000	4,300 total cap. Lube polish. 1987 on all units.
	Lube oils	900	3,500 total cap.
	Hydrogen	1.8	2.7 MMscfd total cap.
*Skandinaviska Raff.			
Scanraff—Lysekil	Hydroref	4,000	Revamp to MHC. Texaco process. Edeleanu. Oct. 1988.

THAILAND

Company and location	Project	Capacity (b/d)	Remarks & completion
Bangchak Petroleum—			
Bangkok	Dist. upgrade	3,500	UOP Merox. Jet fuel. Consult: Chiyoda. Contract: Nippon KKK-$1.3 MM. Feb. 1988.
*Esso Standard Thailand—			
Cholburi	Crude	37,000	100,000 total cap. $200 MM. Planned.
Thai Oil CL—Sriracha	Crude	12,600	76,460 total cap. Foster Wheeler and Chiyoda. 1989 on all units.
	Vac	29,800	50,300 total cap.
	Visbreak	7,400	19,900 total cap.
	Cat reform	2,300	7,600 total cap. Semi bimcat.
	Hydrocrack	15,400	Dist upgrade.
	Hydrogen	28.0 MMcfd	Steam meth reform.

TURKEY

Company and location	Project	Capacity (b/d)	Remarks & completion
Turkish Petroleum			
Refineries—Aliaga-Izmir	Crude	102,020	Eng: Naftechimpromexport. Con: Alarko, Tekfen, Prometsan, Gama, Elpim. 1987.
Kirikkale, Ankara—	Hydrocrack	14,000	Lic. UOP. 1988.
	Hydrogen	19.0 MMcfd	1989.

UNITED KINGDOM

Company and location	Project	Capacity (b/d)	Remarks & completion
BP Oil Grangemouth			
Ref. Ltd.—Grangemouth	Upgrade	....	$69 MM. Foster Wheeler on cat cracker, cat reform. Wimpey and Honeywell on tech. New hydrogen-LPG units. Costain Petrocarbon. 1989.
*Gulf Oil Refining Ltd.—			
Milford Haven	Revamp	....	Hydrotreater. Feasibility: Matthew Hall.
*Shell UK Oil—			
Stanlow	HF alky	....	Upgrade. Eng: Fluor Daniel. 1989.
	Cat crack	....	Replaces older unit. Early 1988.

U.S.S.R.

Company and location	Project	Capacity (b/d)	Remarks & completion
Tenguiz	New ref	100,000	Partec Lavalin Canada with Lurgi Germany, Litwin France. Completion: 1988.
Omsk	Gaso feed fraction	51,107	Technip over all.
	Hydrodesulf	21,925	Eng: Litwin.
Ufa	Gaso feed fraction	51,107	Technip over all.
	HDA	21,925	Eng: Litwin.

VENEZUELA

Company and location	Project	Capacity (b/d)	Remarks & completion
*Corpoven—El Palito	Cat reform-hydrotreat	2,000	Expan-revamp. BTX units Lic: UOP: Con: Kellogg and Inelectra. Completion: early 1990.
*Puerto La Cruz	Cat crack	....	Modern. 12,800 total cap. Kellogg. Summer 1988.
Lagoven—			
Amuay	Delay coke	16,000	$100 MM. Eng. stage. Foster Wheeler. 1990.
	Flexicoke	14,000	61,000 total cap. Eng. stage. Revamp. Ereco-Vepica. $23 MM. 1990.

YUGOSLAVIA

Company and location	Project	Capacity (b/d)	Remarks & completion
*Rafin. Nafte Pančevo—			
Pančevo	Cat reform	17,800	Semi bimcat. UOP. 1995.
	Hydrotreat	25,500	34,300 total cap. UOP. 1995.
	Arom-BT	215	2,815 total cap. UOP. 1990.

ZAMBIA

Company and location	Project	Capacity (b/d)	Remarks & completion
Indeni Petroleum Ref. CL—			
Ndola	Crude	6,350	31,350 total cap. UOP. 1987.
	Hydrocrack	5,300	Dist upgrade. UOP. 1987.

Petrochemicals—WORLDWIDE CONSTRUCTION

*Designates projects listed for the first time in the Journal.

UNITED STATES

***ARISTECH CHEMICAL CORP. Neal, W. Va.** 264,000 t/y (total cap) polypropylene expansion under construction. Himont Spheripol unit. Completion: early 1988.

***ASHLAND CHEMICAL. Neal, W.Va.** 6,805 mt/y maleic anhydride expansion under construction. Feed: butane. Completion: mid 1988.

ADVANCED POLYPRO RESINS INC. Marysville, Mich. 40,000 t/y polypropylene under construction. Contractor: MES. Completion: 1988.

***CAROLINA EASTMAN. Columbia, SC.** 300 t/d polyethylene terephthalate expansion under construction. Contractor: Becon. Completion: Dec. 1988.

CELANESE CHEMICAL. Clear Lake, Tex. 175 MM lb/y acrylic acid expansion. Feed: propylene. Completion: 1987.

160 MM lb/y acetic acid expansion. Feed: propylene. Completion: 1987.

***CHEVRON CHEMICAL. Baytown, Tex.** 91,000 mt/y alphaolefins unit planned. Feed: ethylene. Completion: 1990.

***EL PASO PRODUCTS. Bayport, Tex.** 300,000 lb/y polypropylene unit. Feed: propylene. Completion: early 1989.

EXXON CHEMICAL AMERICAS. Baytown, Tex. Polypropylene unit under construction. Contractor: MES. Completion: 1988.

***FINA OIL & CHEMICAL. LaPorte, Tex.** 113,400 mt/y polypropylene expansion. Feed: ethylene-propylene. Contractor: Fluor Daniel. Completion: end 1988.

Carville, La. Polystyrene expansion under construction. Contractor: Barnard & Burk Group. Completion: 1987.

GOODYEAR TIRE & RUBBER. West Point, Va. 58,000 mt/y polyethylene terephthalate unit under construction. $50 MM. Contractor: John Brown. Completion: early 1989.

KOCH REFINING. Rosemount, Minn. 16,000 mt/y BTX. Staff process. Completion: late 1987.

***MELAMINE CORP. Donaldsonville, La.** 30,000 lb/y melamine unit in engineering stage. Contractor: Becon. Completion: Oct. 1988.

***MOBIL CHEMICAL. Joliet, Ill.** 60 MM lb/y polystyrene expansion. Contractor: Santa Fe Braun. Completion: mid 1988.

***PHILLIPS 66. Pasadena, Tex.** 13,500 mt/y resins expansion under construction. Feed: butadiene-styrene. Completion: Dec. 1987.

***ROHM & HAAS. Deer Park, Tex.** Acetylene upgrading in engineering stage. Contractor: Becon. Completion: Aug. 1988.

SHELL CHEMICAL. Geismar, La. 243,000 mt/y linear higher olefins expansion. Feed: ethylene. Shell process. Contractors: Bechtel and Becon Const. Completion: 1989.

***STANDARD OIL CHEMICAL. Green Lake, Tex.** 23,000-95,000 mt/y maleic anhydride, 31,000 mt/y butanediol, 27,000 mt/y gamma-butyrolactone, 11,000 mt/y tetrhydrofuran. Feed: n-butane. Planned. Completion: 1990.

TEXAS EASTMAN. Longview, Tex. 100,000 mt/y polypropylene expansion. Completion: 1989.

USI CHEMICALS CO. Port Arthur, Tex. 297 MM lb/y lld polyethylene. Feed: ethylene, alphaolefins. Lic: BP Chem. Eng-con: Kellogg. Completion: Apr. 1988.

ARGENTINA

DUPERIAL SAIC. San Lorenzo. 4,600 mt/y phthalic anhydride expansion planned. (17,000 mt/y total cap.) Feed: orthoxylene. Eng: Davy Powergas. Contractor: Duperial. Completion: 1989.

7,000 mt/y ethylene expansion under construction. Feed: naphtha, propane, butane. Contractor: Linde. Completion: late 1988.

ELECTROCLOR SAIC. Bahía Blanca. 41,500 mt/y polyvinyl chloride plant under construction. Feed: vinyl chloride. Contractor: McKee. Completion: mid 1989.

INDUPA. Bahía Blanca. 15,000 mt/y polyvinyl chloride (emulsion). Hoechst process. Contractor: Uhde. Completion: 1987.

45,000 mt/y polyvinyl chloride (suspension). Hoechst process. Contractor: Uhde. Completion: 1987.

PETROQUIMICA BAHÍA BLANCA. Bahía Blanca. 44,000 mt/y ethylene expansion under way. Feed: ethane. Completion: 1987.

***PETROQUÍMICA GENERAL MOSCONI. Ensenada.** 25,000 mt/y butene-1 unit under construction. Feed: C_4 raff. Eng: Techint/Sulzer. Completion: 1988.

25,000 mt/y methanol unit under construction. Feed: natural gas. Eng: Techint/German Linde. Completion: 1988.

45,000 mt/y dimethyl terephthalate unit in engineering stage. Feed: paraxylene. Eng: Krupp Koppers. Completion: 1989.

33,000 mt/y oxoalcohols unit under construction. Feed: olefins. Eng: Techint/CdF Chimie. Completion: 1988.

39,000 mt/y MTBE unit under construction. Feed: Ref. C_4. Eng: Techint/Snamprogetti. Completion: 1988.

40,000 mt/y higher olefins (Dimersol) unit under construction. Feed: propylene/butylenes. Eng: Techint/IFP. Completion: 1988.

17,000 mt/y polyethylene tet. unit in engineering stage. Feed: DMT/ethylene glycol. Eng: Krupp Koppers. Completion: 1989.

AUSTRALIA

SHELL CHEMICAL AUSTRALIA PL. Geelong. 25,000 mt/y polypropylene expansion under construction. Completion: early 1988.

BANGLADESH

CHITTAGONG UREA FERTILIZER LTD. Chittagong. 1,000 mt/d urea unit, 1,000 mt/d ammonia unit under construction. Lic-ammonia: Kellogg. Contractor: TEC. Completion: 1987.

BELGIUM

BASF NV. Antwerp. 945 t/d nitric acid unit in engineering stage. Contractor: Uhde. Completion: 1988.

***NESTE OY** (65%) **and PETROFINA** (35%). **Antwerp.** $404 MM ethylene steam cracker. Negotiations under way.

***PETROFINA. Anterp.** 20,000 mt/y synthetic rubber and thermoplastic elastomer plant. $27 MM.

BRAZIL

CAPUAVA CARBONOS INDUSTRIAIS. Triunfo, RS. 26,000 mt/y carbon black unit. Feed: ethylene tar. Planned. Completion: 1989.

***COPENE. Camaçari.** 25,000 mt/y butene 1. Feed: raffinate 2. $15 MM.

18,000 mt/y isoprene unit under construction. Feed: pentenes. $35 MM. Completion: 1989.

13,500 mt/y octenes unit under construction. Feed: raffinate 3. $6 MM. Completion: 1990.

15,000 mt/y n-butane unit under construction. Feed: LPG. $2 MM. Completion: 1988.

***COPERBO. Cabo.** 25,000 mt/y polyisoprene unit under construction. Feed: isoprene. Goodyear process. Completion: 1989.

NITRIFLEX. Camaçari, Bahia. 5,500 resins. $22 MM. Contractor: IESA. Completion: mid 1988.

Triunfo. 10,000 t/y epm-epdm units.Feed: ethylene, propylene. $40 MM. Contractor: SB Engenharia. Completion: mid 1988.

***NITROFERTIL. Camaçari.** 136 t/d ammonia expansion under construction. Completion: early 1988.

***OXITENO. Triunfo.** 25,000 mt/y acrylic acid, 30,000 mt/y acrylates. Feed: propylene. Planned. Completion: 1990.

20,000 mt/y MEK unit under construction. Feed: n-butenes. Completion: 1989.

POLIALDEN PETROQUÍMICA. Camaçari. 12,000 mt/y hd polyethylene expansion (92,000 total cap). Feed: ethylene. Completion: late 1987.

***PRONOR PETROQUIMICA. Camaçari.** 10,000 mt/y MDI. Feed. benzene. Completion: 1988.

BULGARIA

Burgas. 150,000 mt/y ethylene plant. Lic: Kellogg. Eng: Kellogg-Kawasaki. Contractor: Neftochim. Completion: 1990.

CANADA

ALBERTA GAS CHEMICALS LTD. Medicine Hat, Alta. 1,100 mt/d ammonia unit. Feed: Hydrogen from methanol. $103 MM-Can. Completion: 1987.

***ALBERTA GAS ETHYLENE. Joffre, Alberta.** 1.5 billion lb/y ethylene plant. Planned. $400 MM. Completion: 1991.

ALBERTA NATURAL GAS. Scotford. 2,000 t/d methanol, 11,600 b/d MTBE. Feed: natural gas, butane. Before ERCB. $600 MM.

C-I-L INC. Edmonton, Alberta. 20,000 t/y ethylene vinyl acetate expansion under construction. Contractor: Cana. Completion: 1987.

CHILE

CAPE HORN METHANOL LTD. Punta Arenas. 748,000 mt/y methanol unit under construction. Lic: BASF. Eng-contractor: Kellogg. Completion: 1988.

CHINA

CangZhou, ShuiFu, LiaoHe, LuZhou. 1,000 mt/d ammonia retrofits under construction at these sites. Contractor: Kellogg. Completion: 1987.

Beijing. 60,000 mt/y styrene plant. Monsanto/LCI tech. $30 MM. Contractor: Lummus Crest. Completion: mid 1988.

Harbin. 22,000 mt/y phthalic anhydride plant under construction. Contractor: Davy McKee. Completion: 1989.

***Jinan.** 75,000 mt/y purified terephthalic acid in engineering stage. Contractor: MES. Completion: 1991.

Luzhou. 71,500 mt/y (250,000 mt/y total capacity) urea expansion under construction. Design-eng: Tecnimont. Completion: 1988.

150 t/d ammonia expansion under way. $10 MM. Contractor: Humphreys & Glasgow.

Panjing, Lia Ning Province. 130,000 mt/y ethylene plant. Feed: ethane, propane, butane from Liao He field. Contractors: TEC, C. Itoh, and TPL. Completion: March 1991.

125,000 mt/y lld polyethylene, 40,000 mt/y polypropylene, 10,000 mt/y butene 1 units. Lic: BP on polyethylene, Mitsui PC on polyprop, IFP on butene. Contractor: Technipetrol. Completion: March 1991.

Puyang. 1,000 mt/d ammonia plant in engineering stage. Feed: natural gas. Contractor: Uhde. Completon: 1989.

*1,760 mt/d urea unit in engineering stage. Contractor: Snamprogetti. Completion: 1989.

Shengli. 80,000 mt/y SBR unit under construction. Contractor: Mitsubishi Heavy.

Shanxi. 300 mt/y ammonia under construction. Feed: coal. Topsoe process. Contractor: Lurgi.

Tianjin. 20,000 mt/y propylene oxide unit. Contractor: TEC. Completion: 1989.

CHINA NORTH INDUSTRIES CORP. Lanzhou. 44 MM lb/y toluene diisocyanate plant. Contractor: BASF AS.

DONG TING NITROGEN FERTILIZER COMPLEX. Yueyang, Hunan. 1,000 mt/d ammonia unit in engineering stage. Lic: Kellogg. Eng: Sinokellogg. Contractor: Sinopec. Completion: 1989.

JILIN CHEMICAL IND. Jilin. 9,500 mt/y polystyrene unit in engineering stage. Contractor: Toyo. Completion: 1989.

LANZHOU CHEMICAL INDUSTRY CO. Lanzhou. 60,000 mt/y lld polyethylene plant. Lic: BP. Eng: SinoKellogg. Contractor: Sinopec. Completion: 1990.

QILU PETROCHEMICAL. Qilu, Shandong Province. 63,500 t/y polypropylene plant. Himont tech. $40-50 MM. Eng: Tecnimont. Completion: late 1989.

***SHANGHAI PETROCHEMICAL COMPLEX. Shanghai.** 120,000 mt/y ethylene glycol-ethylene oxide units in engineering stage. Contractor: TEC. Completion: 1989.

70,000 mt/y polypropylene unit in engineering stage. Contractor: Tecnimont. Completion: 1990.

SICHUAN CHEMICAL WORKS. Sichuan. 600 mt/d ammonia-fertilizer plant. $50 MM. Contractor: MW Kellogg. Completion: late 1989.

SINOPEC INTERNATIONAL. Daqing. 60,000 mt/y ethylene expansion under construction. Contractor: Mitsubish Heavy Ind. Completion: 1988.

Ganzu. 80,000 mt/y ethylene revamp under construction. Lic-eng: Kellogg-Sinopec. Completion: 1988.

***XIANGTAN FINE CHEMICAL CO. Hunan Province.** 1,500 mt/y skid-mounted ethylene amine plant. Prebuild and ship by MACC, Calgary and Fort Saskatchewan Eng. Serv., Canada. $3 MM.

YANSHAN UNITED FOREIGN TRADE CL. Yanshan and Shandong provinces. 120,000 mt/y styrene plant. Monsanto/LCI tech. Contractor: Lummus Crest. Completion: mid 1988.

CHINA, TAIWAN

***CHINA AMERICAN PETROCHEMICAL CL. Lin Yuan.** 225,000 mt/y terephthalic acid-phthalic anhydride units. Contractor: Chiyoda. Completion: 1989.

CHINESE PETROLEUM CORP. Kaohsiung. 400,000 mt/y ethylene, 230,000 mt/y propylene, 67,500 mt/y butadiene, 239,000 mt/y aromatics units under construction. Feed: LPG, naphtha, gas oil. Contractor: Kellogg. Completion: mid 1990.

CHINA PETROCHEMICAL DEVELOPMENT CORP. Kaohsiung. 2,000 mt/y naphthalene unit under construction. Feed: fuel oil.

Ta-Sheh. 66,000 mt/y acrylonitrile expansion planned. Feed: propylene. 80,000 mt/y acetic acid expansion planned. Feed: carbon monoxide.

Toufen. 65,000 mt/y caprolactam expansion planned. Feed: cyclohexane.

CHIUNGLONG PETROCHEMICAL CL. Kaohsiung. 22,000 mt/y polypropylene glycol unit under construction.

FORMOSA CHEMICALS & FIBRES CORP. Suao. 200,000 mt/y terephthalic acid unit under constructon. Contractor: Zimmer. Completion: 1988.

*200,000 mt/y ethylbenzene-styrene monomer unit. Mobil/Badger vapor phase and Cosden/Badger processes. Completion: mid 1989.

FORMOSA PLASTICS CORP. Lin Yuan. 450,000 mt/y ethylene plant under construction. Feed: naphtha. Design-eng: Stone & Webster. Completion: early 1989.

HO TUNG CHEMICAL CORP. Jen-Wu, Kaohsiung. n-paraffins plant under construction. Feed: kerosine, light diesel.

***LEE CHANG YUNG CHEMICAL IND. CORP. Lin-Yuan.** 15,000 mt/y glycol ethers unit under construction. Feed: ethylene oxide, alcohols. Completion: Dec. 1987.

***NAN YA PLASTICS CORP.** 250,000 mt/y phthalic anhydride unit in engineering stage. Von Heyden low energy process. Contractor: Davy McKee. Completion: 1990.

***TAIWAN POLYPROPYLENE CL. Kaohsiung.** 60,000 mt/y polypropylene expansion under construction. Lump sum contract: JGC Corp. Completion: June 1988.

TAIWAN SYNTHETIC RUBBER CORP. Kaohsiung. 20,000 mt/y polyethylene unit. Feed: butadiene, styrene. $15 MM. Contractor: CTCI. Completion: early 1988.

USI FAR EAST CORP. Kaohsiung. 113,000 mt/y lld polyethylene unit under construction. Feed: ethylene. Contractor: Mitsubishi HI. Completion: Spring 1989.

COLOMBIA

***CARBOQUIMICA. Bogota.** 20,000 mt/y plasticizers expansion. Planned. Feed: phthalic anhydride, oxoalcohols. Staff will build.

***PETROQUIMICA COLOMBIANA. Cartagena.** 120,000 mt/y polypropylene unit. Union Carbide/Shell Unipol process. Begin construction: early 1988. Completion: 1989.

CZECHOSLOVAKIA

***Kralupy.** Revamp of styrene units. 18,000 mt/y: 1 line complete, 3 lines under construction. Contractor: Technip. Completion: 1988.

Litvinov. 16,000 b/d unicracker for upgrading ethylene feedstocks and ethylene unit modifications. Contractor: Lummus Crest. Completion: 1987.

115,000 mt/y (total cap.) hd polyethylene expansion. Feed: ethylene, propylene, butene. Contractor: Linde.

EGYPT

SEMADCO. Suez. 400 t/d ammonia unit in engineering stage. Lic: Topsoe. Contractor: Technipetrol.

FINLAND

***NESTE OY. Porvoo.** 30,000 mt/y (530 mt/y total cap.) ethylene expansion under construction. Contractor: Neste Eng. Completion: Spring 1988.

120,000 mt/y polypropylene unit under construction. Contractors: Tecnimont/Neste Eng. Completion: late 1988.

FRANCE

ARCO FRANCE. Fos-sur-Mer. 150,000 mt/y propylene oxide unit. Eng: Foster Wheeler. Completion: 1988.

380,000 mt/y gasoline grade TBA in engineering stage. Eng: Foster Wheeler. Completion: 1988.

50,000 mt/y propylene glycol unit. Completion: Sept. 1988.

***NORSOLOR. Saint Avold.** 60,000 mt/y acrylic acid expansion under construction. Feed: propylene. Contractor: CdF Chimie. Completion: mid 1988.

GERMANY, EAST

Berlin. 350,000 mt/y ethylene expansion under construction. Contractor: Linde.

Schkopau. 25,000 mt/y hd polyethylene plant under construction. Unipol process. Feed: ethylene. Contractor: Linde AG.

Schwedt. 60,000 mt/y acrylonitrile plant under construction. Contractor: Technimont. Completion: 1987.

GERMANY, WEST

***COLUMBIAN CARBON. Hamburg.** Carbon black expansion planned. Feed: oil.

***EC ERDOLCHEMIE. Cologne.** 6,000 mt/y isoamylene unit. Completion: 1989-90.

PHENOLCHEMIE. Gladbeck. 70,000 mt/y phenol, 43,000 mt/y acetone expansion under way. Feed: cumene. DM 50 MM. Staff. Completion: late 1988.

RHEINISCHE OLEFINWERKE. Wesseling. 230,000 mt/y ethylene, propylene, C_4, C_5 units under construction. Feed: naphtha. Contractor: Linde.

HUNGARY

***BORSODI VEGYI KOMBINÁT. Kazincbarcika.** 25,000 mt/y MDI, diphenylmethane diisocyanate. Feed: aniline. Contractors: Chisso, Mitsui Toatsu. Completion: 1990.

***TISZAI VEGYT KOMBINAT. Leninváros.** 60,000 mt/y polypropylene unit. Feed: propylene. Contractor: Tecnimont. Completion: 1989.

INDIA

ASIAN PAINTS INDIA LTD. Bombay. 13,500 t/y phthalic anhydride plant in engineering stage. Contractor: Davy McKee AG. Completion: 1989.

ARAVALI FERTILIZERS LTD. Sawai Madhopur, Rajasthan. 1,350 mt/d ammonia plant, two 1,100 mt/d urea plants. $370 MM. Snamprogetti tech. Completion: end 1988.

ASSAM INDUSTRIAL DEVELOPMENT CORP. Maron-Lakwa. Planned facility for 7,500 t/y methanol, 12,000 t/y formaldehyde, 6,000 t/y PVC. Engineering on methanol: Humphreys & Glasgow.

***DEEPAK FERTILIZERS. Bombay.** Ammonia expansion by debottlenecking. Process design-eng study: Fish. Completion: late 1987.

FERTILIZERS & CHEMICALS TRAVANCORE LTD. (FACT) Udyogamandal. 50,000 mt/y caprolactam unit under construction. 225,000 mt/y ammonium sulphate under construction. Feed: ammonia, benzene, oleum, sulfur-di-oxide. Contractors: Chiyoda, FACT, Stamicarbon. Completion: 1988.

HERDILLIA CHEMICALS LTD. Thane. 3,500 mt/y alkyl phenols unit planned. Feed: phenol olefins. Contractor: Power Gas India.

10,000 mt/y EDPM rubber. Feed: ethylene, propylene. Planned.

2,000 mt/y diphenyl oxide, 1,500 mt/y isopropyl phenols, 1,000 mt/y plasticizers units. Planned. Feed: phenol, propylene, phosphorous, oxychloride.

HINDUSTAN POLYMERS. Visakhapatnam. 2,000 mt/y polystyrene plant under construction. Feed: styrene. Completion: Dec. 1987.

5,000 mt/y ABS planned. Completion: Dec. 1988.

*40,000 mt/y styrene expansion planned. Feed: ethylene, benzene.

*12,000 mt/y polystyrene expansion planned. Feed: styrene.

INDIAN PETROCHEMICALS CORP. LTD.

Baroda.

NEW PROJECTS TO BE COMPLETED IN 1988:

13,500 mt/y linear alkyl benzene expansion. Lic-eng: UOP. Contractor: EIL.

10,000 mt/y dimethyl terephthalate expansion-Phase 3. Feed: naphtha. Lic-eng: Dynamit Nobel. Contractor: EIL.

24,400 mt/y orthoxylene expansion. Feed: naphtha. Contractor: EIL.

49,000 mt/y paraxylene, mixed xylenes expansion. Feed: naphtha. Lic-eng: UOP-Mobil. Contractor: EIL.

Nagothane.

NEW PROJECTS TO BE COMPLETED IN 1989:

300,000 mt/y ethylene, 30,000 mt/y propylene units, 36,000 mt/y FCC propylene recovery unit. Feed: gas. Lic: Stone & Webster. Contractor: EIL.

80,000 mt/y ld polyethylene unit. Feed: gas. Lic: CdF Chimie. Contractor: EIL.

135,000 mt/y lld-hd polyethylene unit under finalization. Feed: gas. Contractor: EIL.

50,000 mt/y ethylene glycol, 5,000 mt/y ethylene oxide, 3,600 mt/y diethylene glycol, 160 mt/y triethylene glycol units. Feed: gas. Lic: Union Carbide. Contractor: EIL.

6,000 mt/y polypropylene expansion under construction. Feed: gas. Lic: Tecnimont, Himont. Contractor: EIL.

1,740 mt/y acetylene black unit under finalization. Feed: gas. Contractor: EIL.

INDIAN RAYON CORP. LTD. Renukoot, Uttar Pradesh. 20,000 mt/y carbon black under construction. $35 MM. Contractor: Davy Powergas India. Completion: 1988.

INDO GULF FERTILIZERS & CHEMICALS CORP. LTD. Jagdishpur, Sultanpur UP. 2,200 mt/d urea (twin streams). 1,350 mt/d ammonia. Feed: natural gas. US $600 MM. Contractors: Snamprogetti-Italy, PDIL-India. Completion: May 1988.

NAGARJUNA FERTILIZERS & CHEMICALS LTD. Kakinada. 1,500 mt/y urea unit under construction. Feed: naphtha. $509 MM. Contractors: Snamprogetti, PDIL. Completion: Dec. 1989.

NATIONAL FERTILIZERS LTD. Vijaipur. 445,000 mt/y ammonia, 726,000 mt/y urea units under construction. Feed: natural gas. Contractors: Haldor Topsoe, Snamprogetti, and PDIL. Completion: Dec. 1987.

NATIONAL PETROCHEMICAL CORP. Koyali, Gujarat. 100,000 mt/y ethylene, 60,000 mt/y propylene, 9,000 mt/y butadiene, and 12,000 mt/y mixed butadienes.

***POLYPROPYLENE INDIA LTD. Mathura District.** 30,000 t/y polypropylene. Lic: Solvay tech. Completion: mid 1990. (29% Kanoria Group, 11% each Solvay, Pradeshiya Industrial Investment Corp., 49% public).

***POLYCHEM LTD. Nira, Maharashtra.** 4,000 mt/y polyvinyl acetate, 2,000 mt/y polyvinyl alcohol units. Feed: vinyl acetate monomer. (Letter of Intent received from India Government).

RELIANCE INDUSTRIES LTD. Haldia. 100,000 t/y linear alkylbenzene unit in engineering stage. Contractor: Lummus Crest. Completion: 1988.

***SYNTHETICS & CHEMICALS LTD. Bareilly.** 47,000 mt/y SBR plant, 14,000 mt/y butadiene, styrene, toluene expansion planned. Feed: benzene, ethyl alcohol, petrobutadiene.

INDONESIA

PERTAMINA, BRITISH PETROLEUM, CHEVRON (Gulf Corp.). Sengkang gas field, south Sulawesi. 1,500 mt/d ammonia plant. $276 MM. Planned. Completion: 1989.

PT PETROWIDADA (40% Daewoo Corp.-Korea, 60% PT Petrokimia Gresik and PT Witulan). **Greski, East Java.** 30,000 t/y phthalic anhydride, 1,500 t/y maleic anhydride plant. $18 MM. Eng-manage: Daewoo. Contractor: Lurgi.

PT PUPUK KALIMANTAN TIMUR. Bontang. 1,000 mt/d ammonia, 1,700 mt/d urea units under construction. Contractor: Chiyoda. Completion: 1988.

IRAN

NATIONAL PETROCHEM. Arak. 240,000 mt/y ethylene plant. 60,000 mt/y lld polyethylene plant. 60,000 mt/y hd polyethylene plant. $1.5 billion. Contractors: KTI with Technipetrol. Uhde on hd polyethylene. Completion: 1992.

***Esfahan.** 50,000 mt/y linear alkylbenzene unit in engineering stage. Contractor: Snamprogetti. Completion: 1989.

Shiraz. 1,200 mt/d ammonia unit under construction. Contractor: Humphreys & Glasgow.

IRAQ

Baiji. 1,000 t/d ammonia plant under construction. Lic-eng: Kellogg. Contractor: Hitachi Zosen. Completion: 1988.

1,750 t/d urea plant under construction. Lic: Stamicarbon. Eng: Kellogg. Contractor: Hitachi Zosen. Completion: 1988.

ITALY

DISTILLERIE ITALIANE. San Giovanni Valdarno (Arezzo). 25,000 mt/y phthalic anhydride unit under construction. Feed: orthoxylene. Staff. Completion: end 1987.

***ENICHEM. Porto Torres.** 80,000 mt/y polyvinyl chloride unit under construction. Contractor: Snamprogetti. Completion: 1988.

Ravenna. 115,000 mt/y butadiene extraction expansion in engineering stage. Contractor: Snamprogetti. Completion: 1988.

***MARGHERA BUTADIENE SpA. Porto Marghera.** 60,000 butadiene extraction unit under construction. Contractor: Tecnimont. Completion: 1989.

JAPAN

***GEM CHEMICALS LTD. Chiba.** 60,000 mt/y bisphenol-A unit under construction. Contractor: MES. Completion: Sept. 1988.

IDEMITSU PETROCHEMICAL. Tokuyama. 100,000 mt/y paraxylene unit. UOP parex.

PETROCHEMICAL

***MITSUI PETROCHEMICAL IND. Chiba.** 58,600 mt/y hd polyethylene unit under construction. Feed: ethylene. Contractor: MES. Completion: March 1988.

***NIPPON SHOKUBAI KK CL. Himeji.** 20,000 mt/y acrylic acid expansion. Feed: propylene. Completion: March 1988.

***SHIN-DAIKYOWA PETROCHEMICAL CL. Yokkaichi.** 15,000 mt/y maleic anhydride unit under construction. Feed: butane. Completion: Sept. 1988.

***STANDARD OIL CHEMICAL CO. with MITSUI TOATSU. Osaka.** 9,000 mt/y maleic anhydride conversion. Feed: n-butane. Planned. Completion: 1989.

TONEN SEKIYUKAGAKU. Wakayama. 100,000 mt/y paraxylene expansion. Feed: reformate. Completion: mid 1988.

KOREA

***ARCO CHEMICAL and YUKONG LTD. Ulsan.** Propylene oxide and styrene units in engineering stage. Badger process. Arco technology.

DEMOCRATIC PEOPLE'S KOREAN REPUBLIC. 10,000 t/y ethylene oxide-glycol plant. $6.5 MM. Contractors: Japan Catalytic Chemical and Hitachi Shipbuilding & Engineering.

DAINONG PETROCHEMICAL INDUSTRY CL. Ulsan. 1,000 mt/y phthalic anhydride unit under construction. Feed: maleic anhydride.

HANKOOK CAPROLACTAM CORP. Ulsan. 40,000 mt/y caprolactam unit in engineering stage. Contractor: Chiyoda. Completion: 1988.

***HANNAM CHEMICAL. Ulsan.** 20,000 mt/y polypropylene glycol unit under construction. Feed: propylene oxide. Lic: Dow. Completion: June 1988.

HONAM OIL REFINRY (Lucky Ltd. and Caltex Overseas). **Yeocheon.** 250,000 mt/y ethylene plant. $150 MM. Eng: Lummus Crest. Contractor: TEC. Completion: 1988.

***KOREA KUMHO PETROCHEMICAL CL. Yeochon.** 55,000 mt/y polybutadiene expansion under construction. Feed: butadiene. Contractor: JSR-Japan. Completion: Sept. 1989.

35,000 mt/y butadiene expansion under construction. Feed: C_4. Contractor: BASF. Completion: Sept. 1988.

LUCKY LTD. Yeocheon. 30,000 mt/y polystyrene unit under construction. Feed: styrene. Completion: Dec. 1987.

SAMKYUNG CHEMICAL CL. Ulsan. 30,000 mt/y phthalic anhydride unit under construction. Feed: orthoxylene. Contractor: Lurgi. Completion: March 1988.

TONG YANG NYLON CL. Seoul. 14,000 mt/y polyamide polymerization unit under construction. Contractor: Zimmer. Completion: 1987.

YUKONG LTD. Ulsan. 250,000 mt/y ethylene. 108,000 mt/y propylene. 39,000 mt/y butadiene. $150 MM+. Eng-design: MW Kellogg. Completion: late 1989.

40,000 mt/y propylene oxide unit. Feed: ethylene, propylene, benzene. Completion: mid 1989.

200,000 mt/y paraxylene, 50,000 mt/y orthoxylene units. Feed: xylene mix. Completion: late 1989.

80,000 mt/y polyethylene. Feed: ethylene. Completion: mid 1989.

KUWAIT

***KNPC. Mina Al-Ahmadi.** 1,300 MTBE unit. Feasibility study.

PETROCHEMICAL INDUSTRIES. Shuaiba. 80,000 mt/y polypropylene unit. Feed: propylene. Eng-design-const: Santa Fe Braun. Late 1988.

LIBYA

RAS LANUF REFINERY AND GAS PROCESSING. Ras Lanuf. 330,000 mt/y ethylene plant under construction. Manage-coordinator: Technimont. Competion: 1989.

LUXEMBOURG

DU PONT DE NEMOURS. Contern-Hesperance. 20,000 mt/y polyolefin unit under construction. Feed: hd polyethylene. $120 MM. Contractor: John Brown. Completion: 1988.

MALAYSIA

PETRONAS. Kuantan. 300,000 mt/y MTBE. 50,000 mt/y propylene units planned. Completion: early 1990's.

MEXICO

PEMEX.

Camargo, Chihuahua. 1,500 mt/d ammonia unit under construction. Lic-eng: Kellogg. Completion: June 1989.

Cosoleacaque, Ver. 825,000 mt/y methanol unit in engineering stage. Contractor: Uhde-IMP. Completion: Dec. 1990.

La Cangrejera. 80,000 mt/y polyethylene unit under construction. Contractor: ICI. Completion: June 1989.

120,000 mt/y cyclohexane unit in engineering stage. Completion: 1988.

Lazaro Cardenas, Mich. 445,000 mt/y ammonia unit under construction. Lic-eng: Kellogg. Completion: 1989.

Morelos. 350,000 mt/y propylene unit in engineering stage. Feed: propane. Lic: Houdry. Contractor: Bufete. Completion: June 1988.

50,000 mt/y acrylonitrile unit under construction. Contractor: Niigata. Completion: Dec. 1987.

100,000 mt/y polyethylene unit under construction. Contractor: Asahi. Completion: Dec. 1988.

6,000 mt/y acrolein unit in engineering stage. Completion: 1987.

30,000 mt/y acrylic acid unit in engineering stage. Completion: 1987.

100,000 mt/y butadiene unit in engineering stage. Completion: 1989.

500,000 mt/y ethylene unit under construction. Completion: 1987.

75,000 mt/y isopropanol unit in engineering stage. Completion: 1988.

100,000 mt/y polypropylene unit under construction. Completion: 1988.

150,000 mt/y acetaldehyde unit in engineering stage.

Salamanca. 60,000 mt/y normal paraffins and 50,000 mt/y olefins units planned. Completion: Oct-Dec. 1988.

Salina Cruz, Oax. 1,500 mt/d ammonia unit in engineering stage. Contractor: Kellogg. Completion: Dec. 1988.

Tula. 60,000 mt/y normal paraffin and 50,000 mt/y olefin units planned. Completion: Oct-Dec. 1988.

PRODUCTOS DE ESTIRENO SA DE CV. Atizapan, Edo. 8,000 mt/y ABS, 5,000 mt/y SAN expansions planned. 2,800 MM pesos. Completion: late 1987.

NETHERLANDS

***ARCO CHEMIE. Botlek plant, Rotterdam.** 370,000 mt/y MTBE unit under construction. Contractor: Fluor Daniel. Completion: 1988.

***DSM. South Limburg.** 20,000 mt/y (70,000 total cap.) edpm rubber expansion planned.

15,000 mt/y (65,000 total cap.) ABS expansion under study.

SHELL NEDERLAND CHEMIE. Pernis. 100,000 t/y MTBE unit. Planned.

NIGERIA

NIGERIAN NATIONAL PETROLEUM CORP.
Port Harcourt, Rivers state.

Petrochemical complex comprising:

400,000 mt/y ethylene, 100,000 mt/y propylene, 270,000 mt/y polyethylene, 35,000 mt/y ethylene glycol, 70,000 mt/y polypropylene, 15,000 mt/y butene 1, 100,000 chlorine-caustic soda, 145,000 m/ty vinyl chloride monomer, 140,000 mt/y polyvinyl chloride, 30,000 mt/y plasticizers, 26,000 m/ty 2 ethylhexane, 15,000 mt/y phthalic anhydride. $2 billion. Consult-manage-supervisor: Foster Wheeler. Completion: 1990.

PAKISTAN

***DAWOOD HERCULES CHEMICAL LTD. Chichoki Mallian.** Urea modernization under study. Planned.

SAUDI ARABIA

ARABIAN PETROCHEMICAL. (100% Saudi Basic). **Al Jubail.** 100,000 t/y polystyrene unit, 50,000 mt/y butene-1 unit under construction. Lic: Cosden Tech. and Chimique Charbonnages-France. Contractor: Chiyoda. Completion: 1988.

SAUDI EUROPEAN PETROCHEMICAL. (Sabic, Apicorp, Enichem-Italy, Neste Oy-Finland.) **Al-Jubail.** 500,000 mt/y MTBE. Feed: methanol, butane. $600 MM. Eng-management: Snamprogetti. Completion: 1988.

SOUTH AFRICA

***AECI Ltd. Midland, Sasolburg.** 25,000 mt/y vinyl chloride-polyvinyl chloride expansion under construction. Feed: coal-based acetylene. Completion: end 1988.

SPAIN

ALCUDIA. Puertollano. 40,000 mt/y lld polyethylene unit. 20,000 mt/y polypropylene expansion. Planned.

ALCUDIA:TARRAGONA QUIMICA. Tarragona. 100,000 mt/y polypropylene plant. Himont Spheripol process. $40 MM. Eng: Tecnimont. Completion: Spring 1989.

CEPSA. Algeciras. 45,000 mt/y MTBE unit. Lic: UOP.

EMP. La Coruña. 30,000 mt/y MTBE unit. Feed: C_4 FCC, coker. Process: UOP Hüls. Completion: end 1988.

Puertollano. 53,000 mt/y MTBE unit. Feed: raffinate 1, C_4 FCC. Completion: Spring 1989.

Tarragona. 50,000 mt/y MTBE unit. Feed: raffinate 1. Process: UOP-Hüls. Tecnicas Reunidas. Completion: mid 1988.

ENFERSA. Cartagena, Murcia. 30,000 mt/y urea (and ammonia) revamp. Contractor: Uhde. 1989.

Puertollano. 35,000 mt/y urea (and ammonia) revamp. Contractor: Uhde. 1989.

***HIMONT** (Hercules Inc. and Montedison SpA). 25,000 mt/y polypropylene plant. Planned.

TANZANIA

KILWA AMMONIA CO. Kilwa Masoko. $400 MM ammonia plant. Feed: natural gas (from Songo Songo Island field).

THAILAND

***ETERNAL PETROCHEMICAL CL. Bangkok.** 45,000 mt/y phthalic anhydride unit in engineering stage. Von Heyden low energy process. Contractor: Davy McKee. Completion: 1989.

HMC POLYMERS CL. (Metro CL-Bangkok and Himont Inc.). **Mab Ta Pud, (Rayong province).** 100,000 mt/y polypropylene. Completion: late 1988.

NATIONAL FERTILIZER CORP. Rayong. 900 t/d ammonia, 1,000 t/d urea. Eng-consult: Foster Wheeler Int'l. Chiyoda. Completion: 1988.

NATIONAL PETROCHEMICAL CORP. Mab Ta Pud. 315,000 mt/y ethylene, 105,000 mt/y propylene units. Eng: Lummus Crest. Contractor: Toyo EC. Completion: Aug. 1989.

THAI PETROCHEMICAL INDUSTRY CORP. Rayong. 1,750 t/d urea and 1,000 t/d ammonia units in engineering stage. $180 MM. Turnkey: Chiyoda. Completion: 1988.

THAI PLASTIC AND CHEMICAL CL. 140,000 mt/y vinylchloride monomer, 26,000 mt/y caustic soda, 60,000 mt/y polyvinylchloride. Completion: late 1988.

THAI POLYETHYLENE CL. Rayong Province. 60,000 mt/y lld polyethylene plant under construction. BP gas phase process. Contractor: Mitsui Eng-Ship. Completion: late 1988.

60,000 mt/y hd polyethylene unit. Contractor: MES. Completion: 1989.

TRINIDAD

FERTILIZERS OF T&T LTD. Point Lisas. Two 230 mt/d ammonia expansions planned. $14 MM each. Completion: 1989.

TRINIDAD NITROGEN CL. (51% Government, 49% W.R. Grace). **Point Lisas.** 1,360 mt/d ammonia expansion. $140 MM. Eng-design: Santa Fe Braun. Completion: 1987.

TURKEY

ISTANBUL GÜBRE SANAYII AS. Izmit. 1,200 mt/d (total cap.) ammonia expansion in engineering stage. Feed: natural gas. Contractor: Uhde. Completion: 1988.

TUGSAS (Turkiye Gubre Sanayii AS). **Gemlik.** 1,000 t/d ammonia unit under construction. Lic-eng: Kellogg. Completion: 1988.

UNITED KINGDOM

BP CHEMICALS LTD. Hull. 200,000 mt/y mixed acetyls, acetic acid-acetic anhydride under construction. $140 MM. Manage: Davy McKee. Completion: 1989.

Grangemouth, Scotland. 25,000 mt/y methyl pentene. Contractor: Foster Wheeler. Completion: 1987.

L&K FERTILIZERS LTD. (subsidiary of Kemira Oy). **Hull.** 250,000 mt/y ammonia plant. Feed: acetic acid hydrogen-nitrogen byproducts (from BP plant). Eng: MW Kellogg. Completion: 1988.

SHELL CHEMICALS UK. Carrington. 100 t/y polypropylene expansion under construction. Completion: end 1988.

URUGUAY

AKDENIZ GUBRE SANAYII AS. Mersin. 1,100 t/d nitric acid unit in engineering stage. Lic: Stamicarbon. Eng: Kellogg. Completion: 1987.

U.S.S.R.

***Blagoveshchensk.** 230,000 mt/y pure terephthalic acid in engineering stage. Contractor: MES. Completion: 1992.

***Budyennovsk.** 100 mt/y polypropylene in engineering stage. $146 MM. Contractor: John Brown. Completion: 1990.

***Dzerzhinsk.** 25,000 mt/y acrylic acid, 40,000 mt/y acrylic esters, 40,000 mt/y acrylic emulsions in engineering stage. Processes: Nippon Shokubai KK, Dainippon Ink. Consortium coordinator: Nissho Iwai. Contractor: Mitsubishi HI. Completion: March 1991.

***Novinnonysk.** 150,000 mt/y acetic acid in engineering stage. Contractor: MES. Completion: 1990.

Nishnekamsk. 200,000 mt/y linear alphaolefins unit under construction. Contractor: Davy McKee. Completion: 1989.

Polotsk. 60,000 t/y ethylene-propylene and 55,000 t/y acrylonitrile.

***Sumgait (Baku).** 75,000 mt/y linear alkyl benzene unit under construction. Contractor: Snamprogetti. Completion: 1989.

VENEZUELA

CORPOVEN. Puerto Cabello. 2,500 b/d BTX unit. Eng-lic: UOP. $50 MM. Engineering stage. Completion: 1989.

PEQUIVEN. El Tablazo, Zulia. 200,000 mt/y ethylene unit planned. Feed: ethane. Completion: 1992.

600,000 mt/y polyvinyl chloride unit planned. Feed: vinyl chloride. Completion 1992.

60,000 mt/y ethylene dichloride and vinyl chloride units planned. Feed: ethylene, chloride. Completion: 1992.

Jose, Anzoategui. 500,000 mt/y MTBE unit in engineering stage. Feed: Butanes, methanol. Contractor: Snamprogetti. Completion: 1990.

495,000 mt/y ammonia unit. Feed: natural gas. Eng: Santa Fe Braun. Completion: 1990.

Morón, Carabobo. 495,000 mt/y ammonia unit planned. Feed: natural gas. Completion: 1991.

247,500 mt/y urea unit planned. Feed: ammonia. Completion 1991.

308,000 mt/y solution urea. Feed: ammonia. Planned. Completion: 1991.

700,000 mt/y fertilizer plant. Contractor: Davy McKee. Completion: 1989.

PROPILVEN SA. El Tablazo, Zulia. 70,000 mt/y polypropylene unit. Feed: propylene. (Pequiven, Grupo Zuliano, Mitsui Petchem., Promotora Venoco). Completion: 1990.

***SUPER OCTANOS CA. Jose, Edo. Anzoategui.** 500,000 mt/y MTBE unit. Feed: butane. (Pequiven, Ecofuel). Completion: 1989.

Sulfur—WORLDWIDE CONSTRUCTION

*Designates projects listed for the first time in the Journal.

UNITED STATES

***AMOCO PRODUCTION. Yoakum County, Tex.** 14 mt/d design. 11 mt/d production (from natural gas). Lo-Cat process. Contractors: Pritchard & Zachary. Completion: Jan. 1988.

ARCO OIL & GAS. Willard plant, Yoakum County, Tex. 8 mt/d Claus unit (from CO_2 and natural gas). Turnkey: Hudson Eng. Completion: Fall 1987.

CHEVRON USA INC. Gaviota, Calif. 19 lt/d Selectox tail gas unit (SO_2 scrubbing) under construction. $46 MM. Contractor: Stearns Catalytic. Completion: Fall 1987.

***DIAMOND SHAMROCK. Sunray, Tex.** 50.8 mt/d unit (from crude oil). Const: ProQuip. Completion: 1988.

MOBIL OIL. Torrance, Calif. 400 t/d Claus unit (from ref. gas). Contractor: Kellogg. Completion: Fall 1988.

SHELL OIL. Anacortes, Wash. 17 mt/d design (from refinery).

Denver City, Tex. 5 mt/d design (from natural gas).

VALERO REFINING. Corpus Christi, Tex. 280 lt/d Sulften unit. Eng: Ford, Bacon, Davis. Const: MeriCon Int'l. Completion: 1987.

TOTAL PETROLEUM. Arkansas City, Kans. 10.4 mt/d unit (from refinery gas). Contractor: Litwin. Completion: Nov. 1987.

***WITCO CORP. Petrolia, Pa.** 3.0 mt/y unit (from hydrogenation unit vent gas). Lic: ARI. Locat process. Completion: Nov. 1987.

SULFUR

BRAZIL

PETROBRÁS. Paulínia. 64 mt/d unit (from fuel gas and LPG desulf). Eng: Promon. Lic: Kellogg. Con: Staff. Completion: 1989.

São Mateus do Sul, PR. 50 mt/d unit (from retorted shale gas). Staff. Completion: 1990.

CANADA

SHELL CANADA LTD. Bearberry Field, (nw of Sundre), Alberta. 200 t/d unit. (Demonstration pilot plant). $40 MM. Completion: late 1989.

SUNCOR OIL SANDS LTD. Mildred Lake, Alberta. 400 t/d sulfur revamp under construction. $7 MM. Eng: Partec Lavalin. Completion: 1987.

SYNCRUDE CANADA LTD. Mildred Lake, Alberta. 700 t/d expansion under construction. $17 MM. Eng-procure: Partec Lavalin. Completion: 1987.

2,200 t/d sulfreen plant expansion under construction. $16 MM. Snea(P) process. Eng-procure: Partec Lavalin. Completion: 1987.

CZECHOSLOVAKIA

PKAZ. 34 MMcfd unit under construction. Sulfint process. Contractor: Integral.

CHINA, TAIWAN

CHINESE PETROLEUM CORP. Kaohsiung. 200 mt/d design (from refinery gas). Eng-design: CTCI. Contractor: JGC. Completion: mid 1990.

25 mt/d Sulften unit. Lic: Ford, Bacon, Davis and Union Carbide. Completion: 1987.

Tao Yuan. 100 mt/d design (from refinery gas). Amoco process. Contractor: Chiyoda. Completion: mid 1990.

EGYPT

EL NASR PETROLEUM CO. El-Suez. 120.0 mt/d unit (from refinery gas). Planned. Completion: 1989.

GERMANY, EAST

***HKW Rummelsburg, East Berlin.** Flue gas desulfurization unit in engineering stage. Wellman Lord Process. £42 MM. Contractor: Davy McKee. Completion: 1990.

GERMANY, WEST

***BASF. Marl and Ludwigshafen.** Flue gas desulfurization units under construction. Wellman Lord Process. Contractor: Davy McKee. Completion: 1988.

BKB. Buschhaus. Two 175 t/d units under construction. Contractor: Davy McKee. Completion: 1987.

BKB. Buschhaus and Offleben. Flue gas desulfurization units under construction. Contractor: Davy McKee. Completion: 1987.

MOBIL OIL AG. Woerth. Two-stage Claus sulfreen unit. Contractor: Lurgi.

WINTERSHALL AG. Rutenbrock. 2,700 mt/y Claus unit under construction. Contractor: Davy McKee. Completion: 1987.

GREECE

HELLENIC ASPROPYRGOS REFINERY. Aspropyrgos. 200 mt/d design (from refinery gas). Claus. Completion: 1987.

ITALY

***API. Falconara, Marittima.** 75 mt/d design capacity, 55 mt/d production capacity. Claus unit. Contractor: Nuova IGI. Completion: Jan. 1988.

ENICHEM. Gela. 250 t/d sulfur recovery unit under copnstruction. Contractor: Snamprogetti. Completion: 1987.

***ISAB. Priolo Gargallo, Sicily.** 5,200 mt/y Maxisulf unit in engineering stage. Contractor: Davy Process. Completion: 1989.

SARAS. Sarroch. 150 mt/d design Claus unit (from refinery gas). SNEA process. Completion: 1988.

STANIC. Bari and Livorno. 60 t/d units under construction. Contractor: Snamprogetti. Completion: 1987.

KUWAIT

KUWAIT NATIONAL PETROLEUM.
Mina Abdulla. Three 270 mt/d design (from refinery gas). Claus. Contractor: BTC. Completion: 1987.

Two 510 t/d tail gas treating units. Lic: Shell. Contractor: KSB (Kuwait Santa Fe Braun). Completion: 1987.

140 t/d expansion under construction. Contractor: KSB. Completion: 1987.

MEXICO

PEMEX. Lazaro Cardenas, Mich. 95.9 t/d (from natural gas). Planning.

Matapionche, Ver. 27.1 t/d (from natural gas). Engineering stage.

Salina Cruz, Oax. 32.9 t/d (from refinery-gas). Planning.

NETHERLANDS

NEDERLANDSE AARDOLIE MAATSCHAPPIJ. Emmen. 80 t/d unit under construction. Contractors: Badger and Chiyoda. Completion: 1987.

NORWAY

RAFINOR. Mongstad. 75.0 mt/d unit (from refinery gas). Completion: 1988.

STATOIL. Stavanger. 75 lt/d unit in engineering stage. Contractor: Ford, Bacon, Davis. Completion: 1988.

THAILAND

THAI OIL REFINERY. Sriracha. 33,000 t/y unit (from refinery). McKee process. Contractor: Technip. Completion: 1987.

Two 57.5 units under construction. Lic: Comprimo. Eng-con: Chiyoda. Completion: 1989.

USSR

Astrakhan. Phase 2: 2,970,000 mt/y (4 lines, integrated Claus-Sulfreen units, included in natural gas treatment plant) under-construction. $1 billion-lump sum. Snea process. Contractor: Technip. Completion: 1988.

Tenguiz. 1,580 t/d Claus sulfreen plant (from gas) under construction. Contractor: Partec Lavalin. $200 MM. Completion: 1988.

VENEZUELA

LAGOVEN. Orinoco. 700 mt/d Claus recovery unit (heavy oil upgrader). Contractor: Parsons Int'l. Completion: 1988-89.

***VEPICA/CORPOVEN. Puerto La Cruz.** Sulfur expansion in engineering stage. Process design-eng: Fish. Completion: 1987.

YUGOSLAVIA

RAFINERIJA NAFTE. Pancevo. 530 t/d sulfolane unit. Lic: UOP. Eng-contractor: Foster Wheeler. Completion: 1989.

Gas Processing—WORLDWIDE CONSTRUCTION

*Designates projects listed for the first time in the Journal.

UNITED STATES

AMOCO PRODUCTION. Mallet 2, Hockley County, Tex. 40 MMscfd expansion under construction. 34 MMcfd CO_2 recovery. 28,500 g/d NGL. Process: membrane solvent. Eng: Pritchard. Const: Zachry. Completion: Jan. 1988.

ARCO ALASKA INC. Anchorage. $10 MM expansion under construction. Design: Fluor Daniel. Completion: 1988.

ARCO OIL & GAS. Willard plant, Yoakum County, Texas. 73 MMscfd CO_2 under construction. Turnkey: Hudson Eng. Const: Zachry. Completion: Fall 1987.

CHAMPLIN PETROLEUM. Patrick Draw, Sweetwater County, Wyo. 46,680 g/d ethane, 21,740 g/d propane, 4,160 g/d isobutane, 6,560 g/d normal butane, 5,930 g/d gasoline. Cryogenic expander method. Replaces the refrig-abs process with 25 MMcfd turboexpander. Contractor: RL Frailey.

CHEVRON USA INC. Gaviota, Calif. 60 MMscfd plant under construction. 69,510 g/d propane, 83,244 g/d butane, 70,770 g/d NGL. Refrigeration only. $47 MM. Contractor: Stearns Catalytic. Construction: HB Zachry. Completion: Fall 1987.

***CONOCO INC. Ponca City, Okla.** 30 MMcfd cryogenic gas recovery unit under construction. Completion: 1987.

***EXXON USA. Baton Rouge, La.** 225 MMscfd natural gas liquids plant under construction. Cryogenic expander method. Contractor: Chapman. Completion: early 1988.

***MARATHON OIL. Ogemaw County, Mich.** 15 MMcfd gas liquid extraction and condensate stabilization (plant relocation from South Texas; condensate stabilization is being added). Contractor: ProPak. Completion: Dec. 1987.

ARGENTINA

***YPF. Loma de la Lata, Neuguen Prov.** 100 MMscfd processing and treatment plant. Design: Fish. Contractors: Ing. Tauro-BA and John Brown E&C. Completion: 1988.

AUSTRALIA

***WESFARMERS LPG PL. Kwinana.** 282.5 MMcfd plant. 190,000 mt/y LPG. Contractors: Randall Corp., Clough Eng., T. O'Connor & Sons PL-Adelaide.

WOODSIDE OFFSHORE PETROLEUM PtL. Withnell Bay, Burrup Peninsula (near Karratha). 6 MM mt/y gas liquefaction plant. $3 billion. 2 MM t/y LNG trains. Contractors: Kellogg-JGC-Raymond. Completion: 1989-1990.

BOLIVIA

***YPFB. Vuelta Grande, Luis Calvo Province, Chuquisaca.** 100.0 MMcfd plant under construction. 137,850 g/d LPG, 252,269 g/d condensate. Process: absorption. $31.5 MM. Contractor: Trentham. Completion: 1988.

CANADA

ESSO RESOURCES CANADA LTD. Norman Wells, Alberta. Plant expansion under construction. Contractor: Partec Lavalin. Completion: Dec. 1987.

CHINA

Karamay Oil Field. 600,000 MMcfd LPG extraction unit. Turboexpander method. $4 MM. Contractor: Mitsubishi HI. Completion: 1989.

Liaoning Province. Natural gas liquids plant under construction. Contractor: Fluor Daniel. Completion: 1987.

Zhomg Yuan. 45 MMscfd plant. NGL recovery and fractionation. Turboexpander method. Contractor: Snamprogetti.

EGYPT

EGYPTIAN GENERAL PETROLEUM CORP. Dahshour. 100 MMcfd plant. 21,000 g/d condensate. Expander method. $24 MM. Completion: Jan. 1988.

FRANCE

ELF AQUITAINE. Lacq. 450,000 cm/h LPG. Contractor: Technip. Completion: 1987.

HUNGARY

***Bázakerettye.** 35 MMscfd dehydration unit in engineering stage. $5 MM. Contractor: Mitsubishi HI. Completion: April 1988.

INDIA

OIL & NATURAL GAS COMMISSION. South Bassein field, offshore Bombay. 353 MMcfd gas processing-sweetening complex. Total cost: $250 MM. Snamprogetti contract-$138 MM. Completion: May 1988.

INDONESIA

PERTAMINA. Bontang, East Kalimantan. Badak III. 1.5 MMt/y LNG train. Completion: 1990.

350 mt/y Badak LPG plant under construction. Contractor: Chiyoda. Completion: late 1988.

Arun. 1.6 MMt/y LPG plant. Contractor: JGC. Completion: late 1988.

LIBYA

MOBIL OIL. 15,000 b/sd oil separation plant in engineering stage. Contractor: FW Italiana.

OCCIDENTAL. Hakim. 24,000 b/sd oil separation plant in engineering stage. Contractor: FW Italiana.

SIRTE OIL. 40,000 b/sd oil, 155 MMcfd gas separation-treating plant in engineering stage. Contractor: FW Italiana.

MALAYSIA

PETRONAS. Kerteh, Terengganu. 250 MMcfd expansion. 35 MMscfd ethane, 680,000 propane, 350,000 butane, 280,000 pentanes plus. Pre-consultant appointment. Cryogenic expander method. Completion: 1990's.

MEXICO

PETROLEOS MEXICANOS. Cadereyta, NL. 4,500 b/d NGL fractionation unit under construction.

Nuevo Pemex, Tab. 500 MMcfd plant under construction.

24,000 b/d LPG sweetener under construction.

24,000 b/d LPG sweetener.

NETHERLANDS

PETROLAND BV. Zuidwal, Wadden Zee. Gas treatment plant for Harlingen. Contractor: Lummus Crest BV. Completion: Sept. 1988.

QATAR

***QATAR GENERAL. Arabian Gulf.** 10 trillion cfd plant in engineering stage. Phase I. Contractor: Bechtel. Completion: 1991.

SAUDI ARABIA

ARABIAN AMERICAN OIL. Safaniya. GOSP-4 complex: 100 Mscfd, 250,000 b/d in preliminary design. Lummus Crest.

SYRIA

***AL-FURAT PETROLEUM CO. Tayyim field, ne Syria.** (Syrian Petrolum 50%). 30 MMcfd associated gas treatment plant. $30 MM. Contractor: Propak Systems-Canada.

SWEDEN

SHELL RAFF. AB. Gothenburg. 170 t/d LPG, 70 t/d pentanes+ in engineering stage. Contractor: Linde.

THAILAND

PETROLEUM AUTHORITY OF THAILAND. (25% PTT, 75% Thai Shell Exploration-Production). **Sirikit field, Kamphaeng Phet.** 25 MMcfd plant. 35,000 t/y LPG.

***Rayong Province.** 200 MMcfd expansion (gas from Unocal Thailand fields). 234,900 mt/y LPG, 47,000 mt/y natural gasoline. $78 MM. Consult: Linde AG. Completion: late 1989.

UNITED KINGDOM

***CONOCO LTD. Theddlethorpe.** 1,200 MMcfd natural gas plant under construction. Contractor: John Brown. Completion: 1988.

USSR

Astrakhan. Phase 2: 650 MMcfd natural gas and treatment (also see sulfur). $I billion-lump sum. Snpa-DEA process. Contractors: Petrotech Lavalin Canada-$150 MM and Technip. Completion: 1988.

Tenguiz. 120 MMscfd plant under construction. 70,000 b/d oil. Turboexpander method. $200 MM. Contractor: Partec Lavalin. Completion: 1988.

Related Fuels—WORLDWIDE CONSTRUCTION

*Designates projects listed for the first time in the Journal.

BRAZIL

PETROBRÁS. SÁO MATEUS DO SUL, PR. 2,500 b/cd shale oil extraction. Petrosix process. Staff. 1990.

CANADA

DOME PETROLEUM LTD. Lindbergh, Alta. (40 mi nw of LLoydminster). 15,000 b/d from oil sands. $300 MM. Planned.

Bonnyville, ne of Edmonton, Alta. 25,000 b/d heavy oil. Proposed.

ESSO RESOURCES LTD. Cold Lake, Alta. $400 MM expansion. Completion: mid-1988.

HUSKY OIL OPERATIONS LTD. Lloydminster, Sask. 54,000 b/d heavy oil upgrader. $1.2 billion. Completion: 1991.

PETROCANADA. Fort McMurray. 70,000 b/d from oil sands. $4 billion. Planned.

SYNCRUDE CANADA LTD. Fort McMurray. 30,000 b/d expansion under construction. Contractor: Kellogg. Completion: 1988.

FINLAND

KEMIRA OY. Oulu. 250 t/d ammonia from 650 t/d peat in engineering stage. Contractor: Uhde. Completion: 1989.

RELATED FUELS

GERMANY

VE AHB INDUS.ANLAG. Schwedt. 740,000 resid upgrade (HSC-Desus process). Eng. stage. Contractor: TEC. Completion: 1988.

SWEDEN

NYNÄS ENERGY CHEMICALS COMPLEX AB. (A. Johnson & Co., Sveriges Investeringsbank AB, AGA AB, Superfos a/s). **Nynashamn.** 750,000 t/y coal gasification to 450,000 t/y ammonia. Completion: 1988-89.

UNITED KINGDOM

NATIONAL COAL BOARD. Point of Ayr. 2.5 t/d coal liquefaction pilot plant under construction. $10 M. Contractor: Simon Carves Ltd. Completion: late 1987.

USSR

VO TECHMASHIMPORT. Belovo. 3,000,000 t/y HCCS Reocarb (high concentration coal slurry) unit under construction. Contractor: Snamprogetti. Completion: 1988.

Pipelining—WORLDWIDE CONSTRUCTION

*Designates projects listed for the first time in the Journal.

U.S. CRUDE LINES

CELERON/ALL AMERICAN-Phase II. 525 miles, 30-in. from McCamey, Tex. to Houston, Tex. Completion: 1988.

PACIFIC TEXAS PIPELINE. 1,030 miles, 42-in. from Port of Los Angeles, Calif. to Midland, Tex. $1.6 billion-1984. Contractors: Stearns-Rogers, Potashnick, Morrison-Knudsen, Harding Lawson Assoc. Completion: 1988.

SOUTHERN CALIFORNIA PIPELINE SYSTEM. (Chevron Pipeline (project manager), Four Corners Pipeline, Shell, Texaco).

Los Padres Pipeline: 124 miles, 30-in. from Gaviota, Santa Barbara County, Calif. to Emidio, Kern County, Calif. $350 MM. Proposed.

Angeles Pipeline: 130 miles, 30-in. from Emidio, Kern County, Calif. to Los Angeles Basin refineries. $250 MM. Planned. Completion: mid 1990.

U.S. PRODUCT LINES

***CALNEV PIPELINE.** 4 miles, 8-in. from Devore, Calif. to Blue Cut, Calif. Completion: Nov. 1987.

***KOCH INDUSTRIES INC.** 310 miles, 10-12-in. from Rosemount, Minn. to Milwaukee, Wis. Completion: late 1988.

***MESQUITE PRODUCTS PIPELINE.** (Chevron Pipeline). 18 miles, 14-in; 150 miles, 12-in; 83 miles, 8-in. from Sour Lake, Tex. to Fort Worth, Tex. upgrading planned. $65 MM. Completion: late 1988.

***PLANTATION PIPELINE.** 28 miles, 12-in. from Bremen, Ga., to Austell, Ga. under construction. Contractor: M. Curran & Assoc. Completion: Fall 1987.

U.S. GAS LINES

ANR PIPELINE 379 miles, 30-in. from Defiance, Ohio to Leidy, Penn. (Erie line). Before Ferc.

CANADIAN GATEWAY PIPELINE SYSTEM (Consolidated Natural Gas Co. and Texas Eastern Transmission Corp.). 142 miles, 30-36-in. from Marilla, NY to New York City area. Before Ferc. Completion: Nov. 1988.

COLORADO INTERSTATE GAS. 13 miles, 4-6-in. in Colo., Kans., Okla., Texas, Utah, Wyo. Contractor: Sterling. Completion: Dec. 1987.

***EAST OHIO GAS.** 16.8 miles, 4-8-in. various counties in Ohio under construction. Contractors: Dover and Bill Hawk. Completion: Dec. 1987.

2.8 miles, 12-20 in Ohio under construction. Contractors: Dover and LE Albrecht. Completion: Dec. 1987.

EL PASO NATURAL GAS. 14.8 miles, 30-in. loop lines in Arizona. Before Ferc.

***ENRON CORP.** 50 miles, 30-in. from Bayou La Batre, Ala. to Mobile, Ala. Pending Ferc approval. Completion: Jan. 1989.

191.2 miles, 4-20-in. from Louisiana to South Florida. Pending Ferc.

30 miles, 24-in. north of Janesville, Wisc. to sw corner of Waukesha County. Pending Wisconsin PUC.

Phase II: 80 miles, 30-in; 40 miles, 24-in; 28 miles, 20-in; 122 miles, 4-16-in. expansions from Baldwin County, Ala. to Broward County, Fla. Before Ferc. Completion: 1988.

GREAT LAKES TRANSMISSION. 80 miles, 36-in. loops in Minnesota, Wisconsin, and Michigan. Before Ferc. Completion: 1988.

HADSON GAS SYSTEMS. Caddo, Canadian, Oklahoma counties to Smith cogen plant. $7 MM. Completion: 1988.

KERN RIVER GAS TRANSMISSION. (Williams Cos. and Tenneco). 762 miles, 36-in. from Kemmerer, Wyo. to Bakersfield, Calif. Proposed. $800 MM.

***MONTANA POWER.** 52 miles, 16-in. from Valier, Mont. to Augusta, Mont. Contractor: Gregory & Cook. Completion: Mar. 1988.

MICHIGAN CONSOLIDATED GAS. 25.2 miles, 10¾-in. and 6.8 miles, 6⅝-in. mainline extension from Forest township, Cheboygan County to Pulawski township, Presque Isle County, Mich.

MOJAVE PIPELINE. (Enron Corp. and El Paso Natural Gas). 383 miles, from San Ardo, Calif. to Needles station near Topock, Ariz. (Lateral to Kern County, Calif.). $250 MM. Proposed.

NATURAL GAS PIPELINE CO. OF AMERICA. 5 miles, 36-in. from Cass County, Neb. to Mills Co., Ia. Completion: Nov. 1987.

17.8 miles, 20-in. in Lake County, Ill. (Moraine Pipeline Co.). Contractors: Tulsa-Houston Inc. and Consolidated X-Ray.

23 miles, 24-in. from Carter County, Okla. to Murray County, Okla. (Texoma Northern interconnect). Before Ferc.

NORTHERN BORDER PIPELINE. 396 miles, 36-in. mainline extension from Ventura, Iowa, to Chrisman, Ill. Before Ferc. $374 MM.

***PACIFIC GAS & ELECTRIC.** 40 miles, 4-6-8-10-in; 5 miles, 12-16-20-in; and 5 miles 24-in. on northern California system under construction. Completion: Dec. 1987.

***PEOPLES NATURAL GAS.** 4 miles in Allegheny and Westmoreland Counties and 4.7 miles in Allegheny County under construction. PNG crews. Completion: Dec. 1987.

3 miles, 16-in; 3 miles, 12-in. in Westmoreland County. Planned.

***SEAGULL ENERGY CORP.** 5.8 miles, 16-in; 16.6 miles, 20-in; 41.5 miles, 24-in. offshore Matagorda Island area, Tex. to Old Ocean, Tex. Planned. Completion: 1988.

SOUTHERN NATURAL GAS. 4 miles, 20-in. loop on SNG system in Logansport, La. Completion: Nov. 1987.

***SOUTH JERSEY GAS.** 15.5 miles, 20-in. from Vineland, NJ to Mays Landing, NJ. Bidding. Completion: Jan. 1988.

***SUNSHINE NATURAL GAS SYSTEM** (Coastal Corp.) 608 miles, 30-24-in. from Mobile County, Ala. to Martin County, Fla. Ferc filed. $470 MM. Completion: late 1991.

TEXAS GAS TRANSMISSION. 61 miles, 20-in. from Lawrence County, Ind. to Johnson County, Ind. Before Ferc. Completion: 1988.

62 miles, 16-in. from Breckinridge County, Ky. to Lawrence County, Ind. Before Ferc. Completion: 1988.

6 miles, 4-2-in. in Lawrence County, Ind. Planned. Completion: 1988.

***TRANSCONTINENTAL GAS PIPELINE.** 14 miles, 36-in; 17 miles, 36-in; 3.5 miles, 24-in; 5 miles, 20-in. loops in Pennsylvania and New Jersey. Before Ferc. 1987.

123 miles, 30-in. Mobile Bay, Alabama under construction. Contractor: Harcro. Completion: 1987.

15 miles, 42-in. mainline loop in Alabama under construction. Contractor: Harcro. Completion: 1987.

TRANSWESTERN PIPELINE. 58.9 miles, 20-in. and 21.1 miles, 12-in. from Hemphill County, NM to Roger Mills County, Okla.

***UNITED GAS PIPELINE.** 4 miles, 18-in. in Pearl, Miss. under construction. Contractor: WHC Inc. Completion: Nov. 1987.

***WYCAL-Wyoming-California Pipeline Co.** (Coastal Corp.). 1,000 miles, 16-36-in. from Rocky Mountain Overthrust Belt, sw Wyoming to near Bakersfield, Calif. Ferc filed. Completion: 1989.

YUKON PACIFIC CORP. 820 miles from Prudhoe Bay to Kenai Peninsula. Proposed.

ARGENTINA

GAS DEL ESTADO.

GAS LINES PLANNED FOR COMPLETION IN 1988:

174 miles, 18-in. from Santa Fe, Argentina to Montevideo, Uruguay.

GAS LINES PLANNED FOR COMPLETION IN 1987:

420 miles, 30-in. from Bahia Blanca to Buenos Aires.

295 miles, 12-in. from Mendoza to Santiago de Chile.

PRODUCTS LINE:

360 miles, 10-in. from Loma la Lata to Puerto Galvan. Completion: 1987.

AUSTRALIA

ESSO AUSTRALIA-BHP PETR. 20 miles, 16-in. crude line from Bream to West Kingfish. Completion: late 1987.

SECWA. 110 miles, 6-in. gas line from Gascoyne Junction to Carnarvon. Completion: Dec. 1987.

AUSTRIA

***NEWAG NIOGAS AG.** 11 miles, 6-in. gas line from Tulln to Gablitz. Planning. Completion: 1988.

10 miles, 6-in. gas line from Wieselburg to Scheibbs. Planning. Completion: 1988.

OESTERREICHISCHE MINERALOELVERWALTUNG. 102 miles, 42-in. gas line from Goggitsch to Arnoldstein under construction. Contractor: Saipem. Completion: Aug. 1988.

BELGIUM

DISTRIGAZ.

Gas lines under study.

8 miles, 24-in. from St. Martens-Bodegem to Anderlecht. Completion: 1989.

5 miles, 10-in. from St. Gilles-Waas to St. Niklaas. Completion: 1989.

2 miles, 10-in. from Zellik to Groot-Bijgaarden. Completion: 1989.

2 miles, 16-in. in Vivegnis. Completion: 1988.

11 miles, 12-in. from Brakel to Ruien. Completion: 1987.

3 miles, 12-in. from Aalbeke to Marke. Completion: 1987.

BOLIVIA

***YPFB.**

284 miles, 10-in. and 202.6 miles, 6-in. gas lines from Santa Cruz to Altiplano under construction. Contractor: Protexa-Mexico on 10-in. line. $98.6 MM. Completion: Dec. 1988.

Lines to be completed December 1987:

73.3 miles, 6⅝-4½-in. crude line from Yapacani-Humberto Suárez to Caranda under construction. Staff. $6.6 MM.

139.8 miles, 3½-in. products line from Cochabamba to Puerto Villarroel under construction. Staff. $8.5 MM.

116.2 miles, 4½-in. products lines from Villamontes to Tarija under construction. Staff. $7.1 MM.

116.2 miles, 4½-in. gas line from Villamontes to Tarija under construction. Staff. $7.3 MM.

BRAZIL

***PETROBRAS.** 180 miles, 16-in. products and alcohol line from Guararema to Volta Redonda. Completion: July 1989.

202 miles, 22-in. gas line from Volta Redonda to Sao Paulo. Contractor: Techint. Completion: Feb. 1988.

75 miles, 16-in. products line from Sao Jose dos Campos to Utinga. Contractors: Techint and A. Travassos. Completion: Mar. 1988.

114 miles, 20-in. gas line from Cabiunas to Rio de Janeiro. Completion: Nov. 1988.

31 miles, 14-in. products line from Cubatao to Utinga. Contractors: Coest and A. Travassos. Completion: April 1988.

CANADA

GAS LINES

***CANADIAN WESTERN NATURAL GAS.** 10.5 miles, 6-in. and 18 miles, 4-in. from Foremost to Bow Island under construction. Completion: Nov. 1987.

7 miles, 10-in. from Turner Valley to DeWinton. Planned. Completion: 1989.

6 miles, 6-in. from Coalhurst to Lethbridge. Planned. Completion: 1989.

NOVA. 58 miles, 4-20-in. in Alberta. Completion: Dec. 1987.

POLAR GAS PROJECT. 1,318 miles, 36-in. from Canadian Mackenzie Delta/Beaufort Sea to Edson, Alberta. Filed with NEB. Completion: late 1990's.

SABLE GAS SYSTEMS (TransCanada Pipelines, Nova Scotia Resources). 490 miles, 26-in. from Sable Island through Nova Scotia and New Brunswick to Maine Border. Proposed.

TRANSCANADA PIPELINES. 4 miles, 36-in. loop on Toronto to Niagara line. Completion: Nov. 1987.

***WESTCOAST TRANSMISSION.** 5.0 miles, 6-in. on Redwillow line. Completion: Nov. 1987.

CHINA

620 miles, 24-in. gas line from Yacheng field, Hainan Island to Guangdon Province, Guangzhou, south to Hong Kong. Feasibility study: Fluor Daniel PRC Ltd.

Qiong Zhou Strait crossing (Yacheng, Hainan, Hong Kong gas line). Joint study by: China National Offshore Oil Corp. and J.P. Kenny, London.

155 mile crude line from Shengli field to Huangdao, Shandong province. Eng-construction: Novacorp International.

230 mile gas line from Zhongyaun, Henan Province to Cangzhou, Hebei Province. Contractor: Novacorp International.

CHINA, TAIWAN

CHINESE PETROLEUM CORP. 9 miles, 30-in; 176 miles, 26-in; 33 miles, 24-in. gas line from Yung-An LNG receiving terminal to Hsinchu and Kaohsiung under construction. Contractor: BES. Eng. Completion: Dec. 1990.

COLOMBIA

ECOPETROL.

CRUDE LINES PROPOSED:

100 miles, 14-in. and 50 miles, 12-in. from San Cayetano to Velasquez. Completion: Jan. 1988.

PRODUCTS LINES PLANNED:

18 miles, 6-in. from Medellin to Rionegro.

81 miles, 6-in. from Facatativa to Villavicencio.

20 miles, 12-in. from Sebastopol to Medellin.

GAS LINE PLANNED:

58 miles, 20-on. from Dibulla to Ballenas.

CZECHOSLOVAKIA

534 miles, 56-in. from Waidhaus, West Germany to Uzhgorod, USSR. Completion: 1988.

FRANCE

STE. DU PIPELINE MEDITERANEE-RHONE. 94 miles, products line from La Mede (Bouches-du-Rhone) to Puget-sur-Argens (Var). Eng. study: OTP.

GERMANY

***ERDGAS-Verkaufs.** 3 miles, 6⅝-in. gas line from Anschlubleitung to Adorf Z7 planned.

70 miles, 16-in. gas line from Rehden to Frenswegen planned.

GASVERSORGUNG SUDDEUTSCHLAND. 19 miles, 20-in. gas line from Ravensburg to Lindau. Planned. Completion: Oct. 1988.

***NORDRHEINISCHE ERDGASTRANSPORT.** 13 miles, 36-in. gas loop from Glehn to Horrem under construction. Contractors: Arge Salzg. and Kirchner & Wolf. Completion: Jan. 1988.

RUHRGAS AG. 68 miles, 36-in. gas line from Obermichelback to Amerdingen. Planned. Contractor: Pipeline Eng. Completion: 1989.

16 miles, 32-in. gas line from Epe to Wettringen. Planned. Contractor: Pipeline Eng. Completion: 1988.

HUNGARY

GÁZ-ÉS OLAJSZÁLLITÓ VALLALAT. 78 miles, 28-in. gas line from Beregaroc to Hajduszoboszlo. Design stage. Contractor: Olajterv. Completion: 1988.

INDIA

NATIONAL GAS & PIPELINES CORP. 994 miles, 36-18-in. gas line from Bombay High to six (future) fertilizer plants. Route: Bombay High to Hazira to Jhabua to Bajaipur, (spur to Anta and Sawai Madhopur), to Auraiya (spur to Jagdishpur), to Shahjahanpour to Aonla to Babrala. $1.7 billion. Contractors: Spie-Capag, Nippon Kokan, Toyo Eng. Completion: July 1989.

(Line fill has been completed on the first stage. Commercial delivery starts to the fertilizer complex at Bijaipur).

INDONESIA

PERTAMINA. 8 miles, 6-in. gas line in Aceh. Completion: Feb. 1988.

23 miles, 8-in. gas line for Mundu-Sunyaragi. Completion: Jan. 1988.

34 miles, 8-in. condensate line Lembak, Plaju. Completion: Sept. 1988.

IRAN

NIOC. 62.5 miles, 42-in. crude line from Gurreh to Taheri. Planned. Eng: Snam Progetti. Contractor: Saipem. Completion: Aug. 1988.

PIPELINING

ITALY

***SNAM SpA**

GAS LINES PLANNED:

9 miles, 20-16-in. from Carcare to Cosseria-Cengio. Completion: Apr. 1988.

11 miles, 20-in. loop from Nizza Monferrato to Ponti. Completion: Dec. 1987.

14 miles, 20-in. loop from Monfalcone to Villa Opicina.

GAS LINES UNDER CONSTRUCTION.

Loop of USSR import:

11 miles, 42-in. from Malborghetto to Val di Gleris. Contractor: Sicim. Completion: Dec. 1987.

22 miles, 42-in. from Istrana to Camisano. Contractor: Saipem. Completion: Sept. 1988.

NORTH-WEST AREA

25 miles, 26-in. from Poirino to Chivasso. Contractor: Unione. Completion: Nov. 1987.

SOUTH AREA

8 miles, 24-in. loop from Sparacollo to Carcaci. Contractor: Sicilmontaggi. Completion: July 1988.

KOREA

68 miles, 20-24-in. gas line. Part of a $130 MM project for a gas feeder pipeline system to join a pipeline from LNG facilities at Pyeong Taek to Inchon.

MALAYSIA

PETRONAS. 375 miles, 24-36-in. crude line. Planned.

MEXICO

PEMEX.

CRUDE LINES

39 miles, 16-in. from Imuris to Canonea. Contractor: Spie Capag.

PRODUCTS LINES

186 miles, 12-in. from Guadalajara, Jal to Tepic, Nay. Planned. Completion: Dec. 1988.

215 miles, 16-in. products line Naco to Hermosillo. Planned. Completion: Dec. 1989.

199 miles, 14-in. from Guadalajara to Manzanillo. Planned. Completion: Dec. 1989.

34 miles, 8-in. from Degollado, Mich. to Zamora, Mich. Completion: Dec. 1987.

From Queretaro to San Luis Potosi. Planned. Completion: Dec. 1989.

GAS LINES

155 miles, 24-in. from Jaltipan, Ver. to Salina Cruz, Oax. Planned.

NETHERLANDS

NV NEDERLANDSE GASUNIE. 32 miles, 30-in. gas line from Harlingen to Drogeham in engineering stage. Completion: 1988.

NIGERIA

NIGERIAN NATIONAL PETROLEUM CORP. 90 miles, 6-8-12-16-in. gas lines from West Niger Delta via Warri to Lagos. Consult: Pencol. Contractor: Mannesmann-Imeg. Completion: 1988.

50 miles, 30-in. gas line from West Niger Delta via Warri to Lagos. Consult: Pencol. Completion: 1988.

215 miles, 36-in; 10 miles, 30-in; 11.2 miles, 24-in. gas lines from West Niger Delta via Warri to Lagos under construction. Consult: Pencol. Contractor: Saipem-Snamprogetti. Completion: 1989.

232 miles, 16-in. products lines from Port Harcourt via Aba, Enugu, to Auchi. Design stage. Completion: Nov. 1988.

74 miles, 12-in. products line from Auchi to Benin. Design stage. Completion: Nov. 1988.

SHELL NIGERIA. 26 miles, 24-in. crude line from Nkpoku to Bomu. Planned. Completion: June 1989.

NORWAY

ELF AQUITAINE NORGE AS. 10 miles, 18-in. gas line from East Frigg field to Frigg TCP 2 Platform. Contractor: OTP. Completion: 1987.

STATOIL. 22 miles, 9-6-in. gas and crude lines from Tommeliten to Edda. Detailed engineering under way. Contractor: ETPM. Completion: 1988.

10 miles, 20-in. crude line from Veslefrikk to Oseberg. Planned. Completion: 1989.

25 miles, 36-in. gas line from Zeepipe Sleipner to Statpipe. Planned. Completion: 1993.

515 miles, 42-in. gas line from Zeepipe Sleipner, Norway to Zeebruge, Belgium. Planned. Completion: 1994-1995.

80 miles, 36-in. gas line from Zeepipe Troll to Heimdal. Planned. Completion: 1996.

95 miles, 42-in. gas line from Zeepipe Troll to Sleipner. Planned. Completion: 1996.

PAKISTAN

SUI NORTHERN GAS PIPELINES. 150 miles, 18-in. gas line from Multan to Faislabad. Completion: 1988.

120 miles crude line from Tando Alam field to Karachi refineries. Completion: 1988.

SAUDI ARABIA

***SCECO.** 28 miles, 24-in. crude line, 26 miles, 30-in. gas line in Qurayyah area under construction. Contractor: Saudi Arabian Saipem. Completion: Mar. 1988.

***IBN ZAHR.** 35.6 miles, 10-in. gas line from Juajmah gas plant to Al Jubail MTBE plant under construction. Eng: Snam Progetti. Contractor: Saudi Arabian Saipem. Completion: Nov. 1987.

SPAIN

***BUTANO SA.** 23 miles, 10-8-in. gas line in Valladolid in engineering stage. Contractor: Heredia y Moreno. Completion: 1988.

CAMPSA. 65 miles, 12-in. and 66 miles, 8-in. products lines from Tarragona to Barcelona and Gerona. Contractor: Tecnicas Reunidas and Heredia y Moreno. Completion: 1988.

***ENAGAS.** 16 miles, 6-2-in. in Mejorada, Velilla, and Arganda. Engineering stage. Contractor: Heredia y Moreno. Completion: 1988.

18 miles, 6-2-in. gas line from Alcalá de Henares under construction. Phase 1. Contractor: Heredia y Moreno. Completion: 1987.

GAS MADRID.

Lines to be completed in 1987:

5.7 miles, 16-in. gas line southeast of Madrid under construction. Phase 3. Contractor: Heredia y Moreno.

9.4 miles, 8-2-in. gas line west of Madrid. Phase 2. Contractor: Heredia y Moreno.

7.4 miles, 8-6-in. gas line northwest of Madrid under construction. Phase 1. Contractor: Heredia y Moreno.

CATALANA DE GAS Y ELECTRICIDAD. 99 miles, 16-in. and 19.8 miles, 4-2-in. gas lines from Subirats to Igualada and Manresa under construction. Contractor: Heredia y Moreno. Completion: 1988.

UNION EXPLOSIVOS RIO TINTO SA. 56 miles, 12-in. products line from Huelva refinery to Seville. 42% Campsa funded. $14 MM.

TANZANIA

***TAZAMA PIPELINES LTD.** 31.8 miles, 12-in. loops on crude line from Dar Es Salaam to Morogoro. Eng: Snam Progetti. Contractor: Saipem. Completion: Mar. 1988.

TURKEY

BOTAS. 496 miles, 18-36-in. from USSR gas fields via Bulgaria to Istanbul and Ankara under construction. $300 MM. Turnkey: Spie-Capag. Eng: Fluor. Offshore (Sea of Marmara): Brown & Root. Completion: Sept. 1988.

Extension of 496-mile gas line from Ankara to Izmir. Proposed.

UNITED KINGDOM

BRITISH GAS CORP. 23 miles, 36-in. gas line from Theddlethorpe to Hatton. Planned. Completion: Sept. 1988.

4 miles, 30-in. from Whitwell to Peters Green. Planned. Completion: Sept. 1989.

VENEZUELA

CORPOVEN SA. 373 mile products line from Puerto la Cruz refinery to Maturin, San Tome, Ciudad Bolivar, Puerto Ordaz, Puerto Ayacucho.

MARAVEN SA. Sumandes products line from San Lorenzo, Lake Maracaibo to El Vigia and Tachira (Andes). Planned. $213 MM. Completion: 1990.

YEMEN, NORTH

YEPCO (Yemen Exploration & Production Co.) 142.5 miles, 24-26-in. crude line from Ma Bar area to As Salif area under construction. Contractors: Saipem. Completion: Nov. 1987.

OGJ REPORT

Pipeline Economics Report

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Interstate pipeline systems reflect restructuring

Warren R. True
Pipeline/Gas Processing Editor

Petroleum and natural-gas pipelines in the U.S. continued to see reduced revenues and income from operations in 1986 despite a generally brightening demand picture. This trend is evident from annual reports filed by the regulated interstate pipeline companies with the U.S. Federal Energy Regulatory Commission (FERC).

Further, 1986 pipeline mileage of the 142 liquids-pipeline and 134 gas-pipeline companies reflected flat growth in the U.S. system.

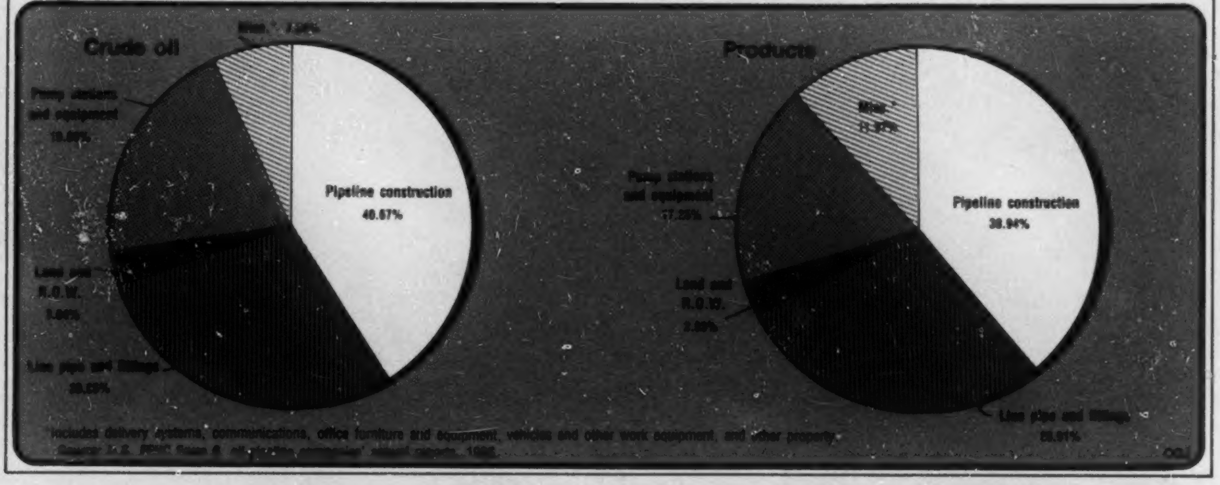
Revenue, income drops. Operating revenues of liquids-pipeline companies at $7.3 billion in 1986 were down almost $173.8 million (−2.3%) from 1985.

The same companies' net income for 1986 exceeded $2 billion, a drop of $379.5 million (−15.6%) from the previous year.

Regulated interstate natural-gas companies in

Fig. 1

Liquid-pipeline investment



*Includes delivery systems, communications, office furniture and equipment, vehicles and other work equipment, and other property.
Source: U.S. FERC Form 6, all pipeline companies' annual reports, 1986.

1986 faced increased producer and end-user cooperation combined with more pipelines opening their systems for contract carriage. The result was a sizable drop in their operating revenues.

For all natural-gas companies, revenues fell more than $15 billion (−27.7%) to $40.7 billion; for the 44 majors, revenues were off $14.1 billion (−29.7%) to $33.5 billion.

Also in this context, net incomes for natural-gas companies also fell in 1986.

For all gas pipelines, net incomes dropped almost $538 million (−24.5%) to $1.6 billion; for majors, incomes fell more than $446 million (−24.9%) to $1.4 billion. (FERC distinctions between "major" and "nonmajor" natural-gas pipeline companies will be explained later.)

Total U.S. interstate mileage for 1986 as reported to the FERC (Table 1) by all 276 reporting companies was 451,895 miles, up only 1,099 miles (0.24%) from 1985.

Total liquids lines (which include crude oil, crude-oil products, and natural-gas liquids) experienced a slight drop of 1,387 miles (−0.8%) to 170,014 miles for 1986, showing up mostly in crude-oil gathering and trunk lines, while product lines increased slightly.

Total natural-gas pipeline utilization increased 2,486 miles (0.89%) for all companies filing mileage data. For the 44 major gas-pipeline companies, the advance was only 3,242 miles or 1.3% over mileage for 1985.

Construction pace. Proposed construction activity for the natural-gas pipeline industry nevertheless is showing signs of health, at least as indicated by the number of projects proposed to the FERC between July 1, 1986, and June 30, 1987 (Table 2).

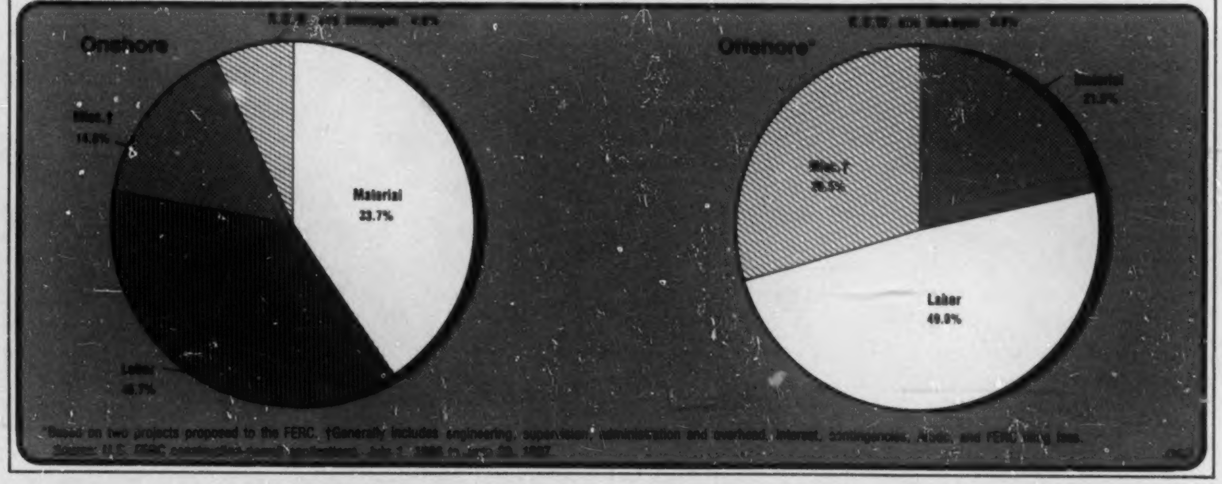
During that period, 106 land and offshore projects were proposed for gas-pipeline construction, compared with 93 for the previous 13-month period.

Proposed mileage for these projects, however, showed a 47.1% drop over the mileage for the projects proposed in the 1985-86 period: 1,304.51 miles compared with 2,466.82. Oil & Gas Journal's Worldwide Construction Report (OGJ, Oct. 26, pp. 71-73) lists 61 individual pipeline projects totaling more than 13,560 miles of U.S. pipeline construction either proposed, planned, or under way.

By comparison, the Journal's Oct. 6, 1986, construction report listed 95 U.S. pipeline projects proposed, planned, or under way, totaling more

Fig. 2

Gas-pipeline construction costs



*Based on two projects proposed to the FERC. †Generally includes engineering, supervision, administration and overhead, interest, contingencies, AFUDC, and FERC filing fees.
Source: U.S. FERC construction-permit applications, July 1, 1986 to June 30, 1987.

Table 1

U.S. interstate pipeline mileage

Year	Miles Gas	Miles Liquid	Miles Total
1975	255,792	172,680	428,472
1976	254,548	174,072	428,590
1977	256,198	170,948	427,146
1978	258,576	162,452	421,028
1979	264,134	169,794	433,928
1980	274,248	172,673	446,921
1981	274,634	172,815	447,449
1982	286,999	172,549	459,548
1983	285,204	167,819	453,023
1984	*258,379	173,922	*432,301
1985	*279,395	171,401	*450,796
1986	*281,881	170,014	*451,895

Source: U.S. FERC Form 6 Annual Reports—oil pipelines; Forms 2 & 2A—gas pipelines.

*Reflects operating mileage as reported under the FERC's classification system for natural-gas pipeline companies effective beginning with the 1984 reporting year. Only major gas-pipeline companies are required to file mileage. See ~~table~~ GAS COMPANIES, p. 64, for definition of major and nonmajor companies and details of companies reporting mileage for 1986.

than 10,800 miles. In a year's time, the total number of projects reported by the Journal has dropped (−35.8%), while the mileage has increased (25.6%).

Natural-gas pipeline projects reported in this year's construction report add to 51 involving more than 8,300 miles of pipeline. The report a year ago listed 74 gas-pipeline projects totaling 6,900 miles.

Prospects for some of these lines being built, although better than at this time last year, are still somewhat doubtful. Many are competing for the same markets or may become uneconomical in the current petroleum markets.

This seems especially true for pipelines to bring natural gas from Alaska into the lower U.S. as well as for projects competing to supply natural gas to the enhanced oil-recovery projects in Californa.

Projects to bring Canadian natural gas into the U.S., primarily to the Mid-Atlantic and Northeast states, had so proliferated throughout 1986 and into this year that the FERC last summer (OGJ, Aug. 24, pp. 13-15) dismissed without prejudice more than 70 of the estimated 126 applications that had been filed. This was an effort to wring some order from among the mass of proposals.

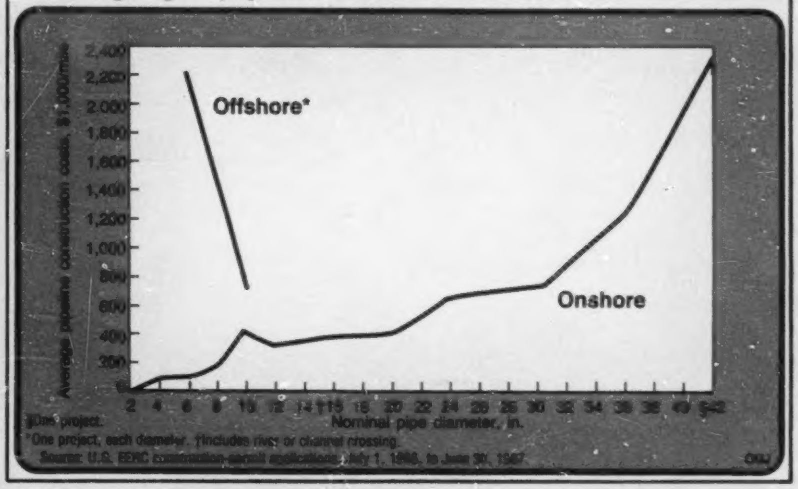
The Commission declared an "open season" until through Dec. 1 on refiling U.S. Northeast gas-expansion projects. And it encouraged sponsors of the dismissed applications to update, amend if desired, and refile applications, complying with the latest agency regulations.

Crude-oil projects in the latest Oil & Gas Journal Worldwide Construction Report total 4 comprising more than 1,809 miles. Here, also, the construction report a year earlier listed 9 crude-oil pipeline projects totaling 3,100 miles.

Finally, the latest Journal report has listed 6 product-pipeline projects with more than 590 miles of pipeline. A year earlier, 12 product-pipeline projects totaling 740 miles were reported.

Fig. 3

Average gas-pipeline construction



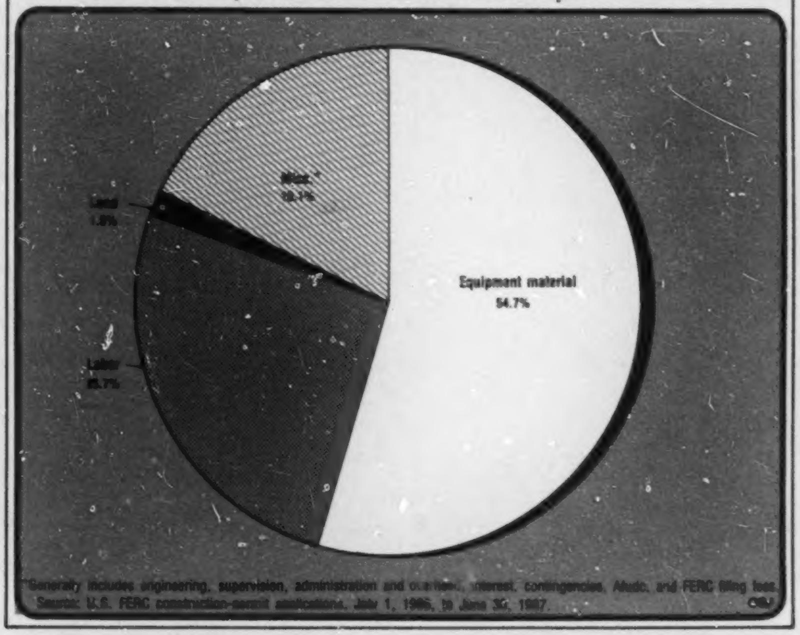
§One project.

*One project, each diameter. †Includes river or channel crossing.

Source: U.S. FERC construction-permit applications, July 1, 1986, to June 30, 1987.

Fig. 4

Onshore compressor-station cost split



*Generally includes engineering, supervision, administration and overhead, interest, contingencies, Afudc, and FERC filing fees.

Source: U.S. FERC construction-permit applications, July 1, 1986, to June 30, 1987.

U.S. interstate network

The pipeline-company tables (pp. 56-57) based on annual reports of the regulated interstate pipeline companies provide a variety of details on each of them, including pipeline mileage, crude-oil and refined-products deliveries, natural-gas sales, operating revenue, and net profit.

System utilization. For any year, U.S. petroleum and natural-gas pipeline mileages are not directly comparable for two reasons:

The number of companies required to file reports with FERC varies each year.

The FERC's system for classifying interstate natural-gas pipeline companies has changed, as has been reported previously (OGJ, Nov. 25, 1985, pp. 55-80; Nov. 24, 1986, pp. 39-69).

Beginning with the 1984 reporting

year, companies have been classified as "major" or "nonmajor" based on total natural-gas transmissions for each of the 3 previous reporting years. (See FERC Accounting and Reporting Requirements for Natural Gas Companies, paragraph 20-011.)

One effect of this change has been that companies subsequently classified as "nonmajor" are exempt from filing certain data. Chief among these excluded figures are mileage and gas-sales figures, although many companies nonetheless file them voluntarily.

These figures should be excluded from a determination of total U.S. interstate pipeline utilization for any given year because of their unreliability from year to year.

Therefore, combining 1986 mileage data for all regulated liquids-pipeline companies (170,014) with mileage reported by the "major" natural-gas pipeline companies (255,652) yields a total figure of 425,666. This represents only a 0.44% increase of 1,855 miles over comparable figures reported for 1985 (171,401 + 252,410 = 423,811).

This compares with a similarly small change for 1985 over 1984, a drop of 2,917 miles (−0.68%) for all liquids-pipeline and major gas-pipeline companies.

At the end of 1986, reports from liquids pipeline companies show a total of 34,209 miles of gathering lines, 54,153 miles of crude-oil trunk lines, and 81,652 miles of products pipelines.

For liquids pipeline companies, the criterion for which a company must file an annual report (Form 6) is whether the FERC determines the company to be an interstate common-carrier pipeline.

These reports for 1986 show that gathering lines decreased by 812

Current pipeline costs

			Cost, $					
Size, in.	Location*	Length, miles	Material	Labor	Misc.†	R.O.W. & damages	Total	$/mile
ONSHORE PIPELINES								
2	Kansas (R)	1.2	11,000	11,000	6,000	3,000	31,000	25,833
2	Nebraska (R)	3.8	34,000	34,000	19,000	13,000	100,000	26,316
4	Missouri (R)	0.13	2,480	7,197	1,680	583	11,940	91,846
4	Iowa	0.43	10,640	17,571	5,029	8,608	41,848	97,321
4	Iowa	1.2	63,553	58,395	33,006	1,945	156,899	130,749
4	Missouri (L)	2.3	44,320	128,603	30,020	10,417	213,360	92,765
4	Florida (L)	3.3	185,300	233,800	93,100	48,500	560,700	169,909
4	Nebraska (R)	5.6	88,000	80,000	47,000	23,000	238,000	42,500
4	Florida (L)	13.1	446,300	481,300	225,200	188,900	1,341,000	102,420
6	Florida (L)	0.1	51,500	35,200	19,000	2,300	108,000	1,080,000
6	Iowa	0.3	12,137	13,649	7,587	3,610	36,983	123,277
6	Iowa	1.01	27,421	32,723	19,273	12,898	92,315	91,401
6	Iowa	1.17	56,292	49,816	31,547	15,169	152,824	130,619
6	Iowa	1.19	120,759	173,634	78,140	20,827	393,360	330,555
6	Iowa	1.23	113,702	84,171	53,445	13,304	264,622	215,140
6	Florida (L)	1.3	140,800	219,300	78,200	27,800	466,100	258,538
6	Colorado (R)	2.4	67,000	45,000	26,000	12,000	150,000	62,500
6	Louisiana	2.5	70,500	158,700	98,465	33,000	260,665	144,266
6	Florida (L)	8.2	372,500	406,400	190,300	175,100	1,144,300	139,549
6	Missouri-Iowa	8.75	288,146	321,855	190,234	116,568	916,803	104,777
6	Florida (L)	10.6	546,400	714,800	299,900	160,000	1,721,100	162,368
6	Colorado (R)	21.3	406,000	385,000	206,000	103,000	1,100,000	51,643
8	Pennsylvania (R)	0.14	37,600	46,520	7,165	—	91,285	652,036
8	Pennsylvania	1.41	212,000	534,000	106,810	45,000	897,810	636,745
8	Florida (L)	1.8	184,800	218,300	87,400	39,300	529,800	294,333
8	Florida (L)	4.9	308,900	374,200	161,200	108,000	952,300	194,347
8	Florida (L)	5.0	309,000	356,200	157,300	110,900	933,400	186,680
8	Florida (L)	7.1	426,200	600,100	248,000	150,000	1,424,300	200,606
8	Florida (L)	9.3	477,100	514,100	242,300	197,900	1,431,400	153,914
8	Florida (L)	16.0	825,800	1,067,400	469,600	345,800	2,708,600	169,288
8	Florida (L)	22.3	985,100	1,424,000	598,200	264,300	3,371,600	151,193
10	Massachusetts (L)	6.1	519,000	1,381,500	627,466	193,600	2,721,566	446,158
10	Massachusetts (R)	7.5	649,000	1,665,000	784,134	360,000	3,458,134	461,085
12	Massachusetts (L)	2.5	303,000	686,500	363,830	320,000	1,673,330	669,332
12	Massachusetts (R)	7.9	737,200	1,717,800	809,312	251,300	3,515,612	445,012
12	New Hampshire (L)	10.5	998,600	2,272,600	1,089,600	420,000	4,780,800	455,314
12	Oklahoma	17.2	1,073,000	1,485,000	305,333	—	2,863,333	166,473
16	Delaware-Penn.	0.98	275,799	794,273	255,110	—	1,325,182	1,352,227
16	Delaware-N.J. (C)	1.2	349,300	3,043,000	606,563	3,000	4,001,863	3,334,886
16	Florida (L)	6.3	649,600	657,400	302,600	114,400	1,724,000	273,651
16	New Jersey	8.0	1,122,400	2,108,600	1,082,232	900,000	5,213,232	651,654
16	Florida (L)	11.9	1,248,900	1,322,200	609,200	256,900	3,437,200	288,840
16	Pennsylvania (R)	13.4	1,540,000	1,775,000	206,914	40,000	3,561,914	265,814
16	Oklahoma	14.1	1,225,000	1,193,000	274,334	—	2,692,334	190,946
16	Rhode Island	25.3	2,125,400	6,262,700	3,494,547	2,024,400	13,906,647	549,670
16	Kentucky-Indiana (L)	61.83	6,133,000	8,030,000	2,431,843	1,340,000	17,934,843	290,067
20	New Jersey	1.78	423,833	428,469	141,716	85,800	1,079,818	606,639
20	Pennsylvania	2.48	675,000	1,170,000	192,460	—	2,037,460	821,566
20	Pennsylvania (L)	5.61	1,296,000	3,005,000	593,174	180,000	5,074,174	904,487
20	Rhode Island	10.7	1,350,600	2,958,700	1,602,084	688,000	6,599,384	616,765
20	Penn.-Delaware	23.7	4,701,600	5,870,800	2,860,181	2,400,000	15,832,581	668,041
20	Florida (L)	28.2	3,547,800	2,683,000	1,438,500	409,100	8,078,400	286,468
20	Louisiana (L)	50.0	5,289,700	4,838,000	2,293,986	1,280,000	13,701,686	274,034
20	Indiana	60.28	8,181,000	10,492,000	3,353,344	1,473,000	23,499,344	389,836
24	W. Virginia (L)	0.3	85,100	104,100	34,500	2,975	226,675	755,583
24	New York (R)	0.49	535,000	319,500	47,729	—	902,229	1,841,284
24	Louisiana (R)	0.67	197,200	288,000	70,500	—	555,700	829,403
24	Massachusetts (R)	2.0	516,800	2,420,000	957,200	192,000	4,086,000	2,043,000

miles (−12.3%) and crude-oil lines, by 1,691 miles (−3.03%) over totals reported for 1985. Products lines increased by 1,116 miles (1.4%).

The drop in crude-oil trunk and gathering lines (−2,503 miles; −2.75%) reflects continued declines in U.S. field development and crude-oil production. The overall decline is in line with the erratic pattern of liquids-pipeline utilization for the past 6 years (Table 3).

The pattern of falling U.S. crude-oil transportation and rising U.S. product movement by pipeline is likely to continue for several years as less and less domestic crude oil moves through gathering and trunk systems to U.S. refineries and more and more foreign crude is imported directly, in most instances, to those same refineries.

Natural-gas transmission lines were up 3,740 miles (1.9%) for all companies; 3,749 miles (2.1%), for majors. Storage lines increased 2,957 miles (65.4%) for all filing gas companies; 2,932 miles (67.7%), for majors.

Field-line utilization fell 4,211 miles (−5.5%) for all companies; 3,439 miles (−5.1%), for majors.

Deliveries rise. Throughput for liquids-pipeline companies in 1986 showed moderate but consistent gains over 1985. Natural-gas pipelines, on the other hand, were showing the effects of the structural changes in their industry.

Crude-oil and product deliveries last year exceeded 11 billion bbl, an increase over 1985 of 337.7 million bbl (3.14%).

The largest gain was in product deliveries, up 209,897 million bbl (4.7%) over 1985. Crude-oil deliveries rose only fractionally, 47,762 million bbl (0.8%).

The healthy gain in product deliveries reflects increased demand across

Table 2

Size, in.	Location*	Length, miles	Cost, $ Material	Labor	Misc.†	R.O.W. & damages	Total	$/mile
ONSHORE PIPELINES—continued								
24	Massachusetts (R)	2.3	451,500	1,557,200	662,256	294,800	2,965,756	1,289,459
24	New York (R)	5.9	1,444,400	3,624,900	1,422,215	818,000	7,390,515	1,238,901
24	Louisiana (R)	10.0	2,861,400	1,968,000	1,607,974	316,800	6,754,974	675,497
24	New York (R)	13.16	2,964,000	2,513,000	542,326	51,000	6,070,326	461,271
24	Pennsylvania (L)	14.5	7,244,946	10,078,866	2,283,558	793,565	20,400,935	1,406.961
24	New Jersey	15.2	4,771,000	10,261,000	2,213,076	1,216,000	18,461,076	1,214,544
24	Louisiana (R)	19.0	4,905,500	3,273,800	2,887,134	601,600	11,668,034	614,107
24	New York	20.08	4,463,000	3,520,000	923,532	450,000	9,356,532	465,963
24	Louisiana (R)	21.6	5,341,800	2,985,200	3,061,892	687,300	12,076,192	559,083
24	Pennsylvania	37.0	8,956,000	6,484,000	2,171,855	1,061,000	18,672,855	504,672
24	Florida (L)	39.7	6,681,702	5,381,000	3,516,900	538,100	16,117,700	405,987
30	New York (L)	1.1	280,500	547,500	372,447	28,000	1,228,447	1,116,770
30	Massachussets (L)	1.2	501,300	850,500	492,580	57,000	1,901,380	1,584,483
30	Massachussets (L)	1.4	433,700	1,040,700	525,345	70,000	2,069,745	1,478,389
30	New York (L)	1.9	532,300	1,086,200	563,597	61,000	2,243,097	1,180,577
30	Florida (L)	2.0	586,900	899,100	390,400	27,500	1,903,900	951,950
30	New York (L)	2.0	481,600	891,800	541,926	45,000	1,960,326	980,163
30	New York (L)	2.3	592,200	1,261,500	621,281	73,000	2,547,981	1,107,818
30	Massachussets (L)	2.7	659,300	1,117,800	780,146	79,000	3,236,246	1,198,610
30	New York (L)	2.9	833,300	1,612.900	765,460	118,000	3,329,660	1,148,159
30	Massachussets (L)	2.9	824,600	2,162,200	894,192	116,000	3,996,992	1,378,273
30	Massachussets (L)	3.0	891,200	2,008,200	878,534	163,000	3,940,754	1,313,585
30	New York (L)	3.7	997,500	1,809,300	918,667	84,000	3,809,467	1,029,586
30	New York (L)	3.9	1,102,500	2,218,300	1,062,373	159,000	4,542,173	1,164,660
30	Massachussets (L)	4.4	1,281,900	2,644,700	1,225,258	144,000	5,295,858	1,203,604
30	Massachussets (L)	5.7	1,491,100	4,269,100	1,748,356	230,000	7,738,556	1,357,641
30	New York	5.7	1,745,700	3,144,300	1,479,354	183,000	6,552,354	1,149,536
30	Pennsylvania	7.3	2,643,700	2,945,900	901,206	287 800	6,778,606	928,576
30	Florida (L)	8.0	1,853,500	1,600,700	940,000	108,700	4,502,900	562,863
30	New York (L)	11.2	3,816,400	6,026,900	2,948,219	804,000	13,595,519	1,213,886
30	W. Virginia (L)	11.7	3,318,900	4,059,900	1,345,500	116,025	8.840,325	755,583
30	Florida (L)	33.0	7,831,300	5,378,700	3,656,400	462,300	17,328,700	525,112
30	Florida (L)	37.0	8,133,900	5,276,600	3,742.900	502,800	17,656,200	477,195
30	Alabama	51.9	12,372,607	10,351,542	6,518.628	1,358,042	30,600,819	589,611
36	Pennsylvania (L)	1.25	657,835	673,118	356.047	80,000	1,767,000	1,413,600
36	Pennsylvania (L)	3.75	2,226,000	3,222,000	694,496	150,000	6,292,496	1,677,999
36	Pennsylvania	6.00	3,058,000	6,881,000	1,240,595	360,000	11,539,595	1,923,266
36	Pennsylvania	7.25	3,759,000	5,064,000	1,210,834	290,000	10,323,834	1,423,977
36	Pennsylvania	9.50	4,340,000	7,805,000	1,621,712	550,000	14,316,712	1,507,022
36	Pennsylvania	10.00	4,254,000	7,863,000	1,560,913	600,000	14,277,913	1,427,791
36	Ohio-Pennsylvania	17.53	7,753,000	11,486,000	2,653,166	561,000	22,453,166	1,280,842
36	Pennsylvania (L)	24.26	11,108,000	15,612,000	2,530,952	970,000	31,220,952	1,286,931
36	Pennsylvania (L)	24.75	12,389,054	17,235,134	3,904,946	1,356,650	34,885.784	1,409,527
36	Ohio-W. Virginia-Penn.	36.18	14,321,000	22,652,000	4,941,136	1,158,000	43,072,136	1,190,496
36	Pennsylvania	217.50	84,734,000	129,639,000	30,113,378	10,198,000	254,684,378	1,170,963
42	New Jersey	5.5	4,276,000	6,849,000	1,489,022	320,000	12,934,022	2,351,640
Total/onshore projects		**1,300.31**	**$308,841,124**	**$428,232,436**	**$136,274,997**	**$43,987,786**	**$919,648,343**	**$707,253**
1986-report total/onshore		**2,370.86**	**$653,171,513**	**$670,825,550**	**$309,727,486**	**$80,052,099**	**$1,713,776,648**	**$722,850**
OFFSHORE PIPELINES								
6	Louisiana	0.3	75,000	550,000	41,660	—	666,660	2,222,200
10	Louisiana	3.9	670,000	1,150,000	980,000	—	2,800,000	717,949
Total/offshore projects		**4.2**	**$745,000**	**$1,700,000**	**$1,021,660**	**—**	**$3,466,660**	**$825,395**
1986-report total		**95.96**	**$27,407,359**	**$44,910,678**	**$25,150,204**	**420,040**	**$97,888,281**	**$1,020,095**
Total/all projects		**1,304.51**	**$309,586,124**	**$429,932,436**	**$137,296,657**	**$43,987,786**	**$923,115,003**	**$707,634**
1986-report total		**2,466.82**	**$680,578,872**	**$715,736,228**	**$334,877,690**	**$80,472,139**	**$1,811,664,929**	**$734,413**

Source: U.S. FERC construction permit applications, July 1, 1986, to June 30, 1987.

*L = Loop; R = replacement; C = river or channel crossing. † Generally includes engr., supv., surveying, interest, adm. & overheads, contingencies, Afudc, and FERC fees.

Table 3

Investment in liquids pipelines

	Company and investment, $						
	A	B	C	D	E	Total, $	%
CRUDE PIPELINES INVESTMENT BY FIVE COMPANIES							
18 Land	1,759,081	814,497	293,698	966,772	1,124,012	4,958,060	0.30
19 Right of way	12,139,025	1,004,094	316,392	16,240,041	14,878,273	44,577,825	2.74
20 Line pipe	134,882,087	25,663,608	11,262,597	95,175,023	151,224,489	418,207,804	25.67
21 Line pipe fittings	9,067,392	907,765	1,754,290	17,109,157	26,402,094	55,240,698	3.39
22 Pipeline construction	188,909,303	27,482,679	16,160,573	216,674,537	213,377,895	662,604,987	40.67
23 Buildings	19,211,690	4,827,378	2,453,994	13,507,861	9,530,272	49,531,195	3.04
24 Boilers	—	—	—	—	—	—	
25 Pumping equipment	23,110,667	5,524,747	2,414,882	16,872,369	49,028,541	96,951,206	5.95
26 Machine tools and machinery	—	—	—	33,140	—	33,140	—
27 Other station equipment	33,418,715	18,356,368	4,539,253	44,452,993	26,780,166	177,547,495	10.90
28 Oil tanks	14,494,825	5,979,056	5,678,530	16,259,493	25,845,284	68,257,188	4.19
29 Delivery facilities	—	—	5,275,462	2,290,758	6,878,472	14,444,692	0.89
30 Communications systems	541,235	3,170,070	68,631	10,154,566	3,193,250	17,127,752	1.05
31 Office furniture and equipment	1,039,700	204,653	203,519	1,301,508	1,413,129	4,162,509	0.26
32 Vehicles and other work equip.	6,966,326	1,909,806	522,693	5,704,674	232,065	15,335,564	0.94
33 Other property	—	—	—	—	49,795	49,795	0.01
34 Total	$495,540,046	$95,844,721	$50,944,514	$456,742,892	$529,957,737	$1,629,029,910	100.00
PRODUCT PIPELINES INVESTMENT BY FIVE COMPANIES							
18 Land	4,258,254	1,763,961	532,035	936,546	3,105,273	10,596,069	0.37
19 Right of way	28,011,020	10,825,804	18,427,609	8,612,026	6,888,616	72,765,075	2.56
20 Line pipe	339,947,575	67,586,031	107,107,622	86,230,220	98,735,664	699,607,112	24.63
21 Line pipe fittings	71,872,261	12,811,359	15,062,869	1,628,102	20,305,651	121,680,242	4.28
22 Pipeline construction	562,242,538	109,136,840	199,561,098	97,827,608	137,305,650	1,106,073,734	38.94
23 Buildings	23,494,550	3,982,143	4,616,505	10,420,534	17,268,711	59,782,443	2.10
24 Boilers	—	—	—	—	—	—	
25 Pumping equipment	45,742,948	5,857,252	30,739,859	28,200,293	23,536,641	134,076,993	4.72
26 Machine tools and machinery	—	—	—	—	353,373	353,373	0.01
27 Other station equipment	117,765,625	20,974,208	37,342,124	23,108,744	96,714,654	295,905,355	10.42
28 Oil tanks	47,958,797	16,961,752	8,752,431	17,444,483	45,525,335	136,642,798	4.81
29 Delivery facilities	—	—	9,616,375	10,843,868	44,948,280	65,408,523	2.30
30 Communication systems	1,117,397	316,183	2,130,593	8,692,502	—	12,256,675	0.43
31 Office furniture and equipment	9,842,391	2,117,270	2,293,689	584,119	652,162	15,489,631	0.55
32 Vehicles and other work equip.	5,338,085	1,734,659	7,417,134	2,100,323	1,818,381	18,408,582	0.65
33 Other property	72,893,538	—	18,629,920	—	—	91,523,458	3.22
34 Total	$1,330,484,979	$254,067,462	$462,229,863	$296,629,368	$497,158,391	$2,840,570,063	*100.0

Source: U.S. FERC Form 6, Annual Report of Oil Pipeline Companies, Dec. 31, 1986.

* Actual total does not equal 100 due to independent rounding.

the spectrum of products in 1986.

Trunkline traffic for U.S. crude-oil and product pipelines also showed modest but real gains in 1986.

Traffic totaled 1,893 billion bbl-miles of crude oil, an increase of 51 billion bbl-miles (2.8%) over 1,842 billion bbl-miles for 1985. Product traffic totaled 1,573 billion bbl-miles, compared with 1,500 billion bbl-miles in 1985, an increase of 73 billion bbl-miles (4.86%).

Total trunkline traffic for crude-oil and product pipelines in 1986 reached 3,466 billion bbl-miles, an increase of 124.7 billion bbl-miles (3.73%) over 3,341.8 billion bbl-miles for 1985.

Sales plummet. The real story, however, lies in natural-gas transmissions.

In 3 years of reporting, gas sales by majors have fallen 4,648.6 bcf (36.2%) from 12,846.1 bcf in 1984.

Among all filing companies for 1986, gas transmissions were slightly less than 9.5 tcf, down almost 3.1 tcf (−24.5%) from 12.5 tcf in 1985. Among majors, transmissions fell to just short of 8.2 tcf, down more than 2.8 tcf (−25.8%) from 11 bcf in 1985.

But the most precipitous fall occurred in 1986 and is a direct result of industry structural changes begun in late 1985. First issued in October 1985, FERC Order 436 was an effort by the Commission to make the natural-gas transmission industry more competitive.

It proposed allowing companies which had formerly bought then resold natural gas on long-term contracts with producers and end users to open part of their systems for transporting someone else's gas for a fee. In effect, the transmission company would become a middle man between the gas producer and the gas end user.

Although most companies initially resisted the move primarily because it failed to address the industry's burgeoning take-or-pay problems in a glutted gas market, 1986 saw a large number of companies finally agreeing to become "open-access" pipelines as proposed in the order.

And in August of this year, the commission issued Order 500 to complement 436 by proposing a mechanism which addresses the problem of pipelines' take-or-pay liabilities.

Last year, 40 natural-gas transmission companies either applied for, received, or were otherwise involved in open-access-status decisions by the commission. Of these, 16 were majors (OGJ, May 18, p. 19).

The drastic reduction in natural-gas throughput in 1986 along with the slash in company operating revenues and incomes discussed earlier are a direct result of more producer/end-user cooperation and subsequent circumvention of the conventional pipeline contractual arrangements used to serve given markets.

Further aggravating gas pipelines' reduced throughput problems as a result of the effects of 436 are the recent warmer-than-normal winters.

Most interstate gas pipelines reported to the FERC increased gas volumes and revenues from transport of gas for others in 1986. But all say that profits from such transactions are considerably slimmer than under the traditional buy/resell long-term-contract procedures.

Rankings. The Journal ranks the top 10 natural-gas and liquids pipeline companies in three categories: mileage, natural-gas sales or liquids barrel-mile throughput, and operating income (p. 48). These rankings are broken out from the pipeline-company tables (pp. 56-64).

For all natural-gas pipeline companies, net income as a portion of gas-plant investment dropped to 3.4% in 1986 from 4.5% for 1985 and 8.7% for 1984.

Major companies' net income as a portion of gas-plant investment in 1986 fell to 3.2% from 4.3% for 1985 and 7.6% for 1984.

Companies' gas-plant investment is running counter to trends for operating revenues and net incomes for all pipelines as well as for major ones.

For 1986, all gas companies reported an industry gas-plant investment totaling more than $49.4 billion for 1986 compared with $48.3 billion for 1985 and $47.3 billion for 1984. Majors' gas-plant investment in 1986 reached $42.2 billion compared with $41.9 billion in 1985 and $37.8 billion for 1984.

This represents an increase for all companies in 1986 of $1.1 billion (2.3%) compared with 1985. For majors, the increase is less than 1%.

For interstate common-carrier crude-oil and products pipeline companies, net income as a percentage of investment in carrier property was 9.2% in 1986 compared with 11.3% in 1985 and 13.1% in 1984.

The liquids-pipeline companies increased investment in carrier property for 1986 by $778.5 million (3.6%) to $22.4 billion compared with $21.6 billion for 1985 and $19.4 billion for 1984.

Tracked companies. In this annual Pipeline Economics Report, Oil & Gas Journal has for several years been tracking investment by five crude-oil pipeline companies and five products pipeline companies.

Table 3 indicates that investment by the five crude-oil pipelines stood at $1,629 million at the end of 1986 compared with $1,568 million at the end of 1985, an increase of more than $61 million (3.89%).

Investment by the five products pipeline companies was $2,840 million at the end of 1986 compared with $2,847 million at the end of 1985, a fractional decrease of $6.2 million (−0.2%).

Fig. 1 illustrates the investment split in the crude-oil and products pipeline companies. As shown, the major investment is in pipeline construction: 40.67% for the crude-oil pipelines and 38.94% for the products pipelines.

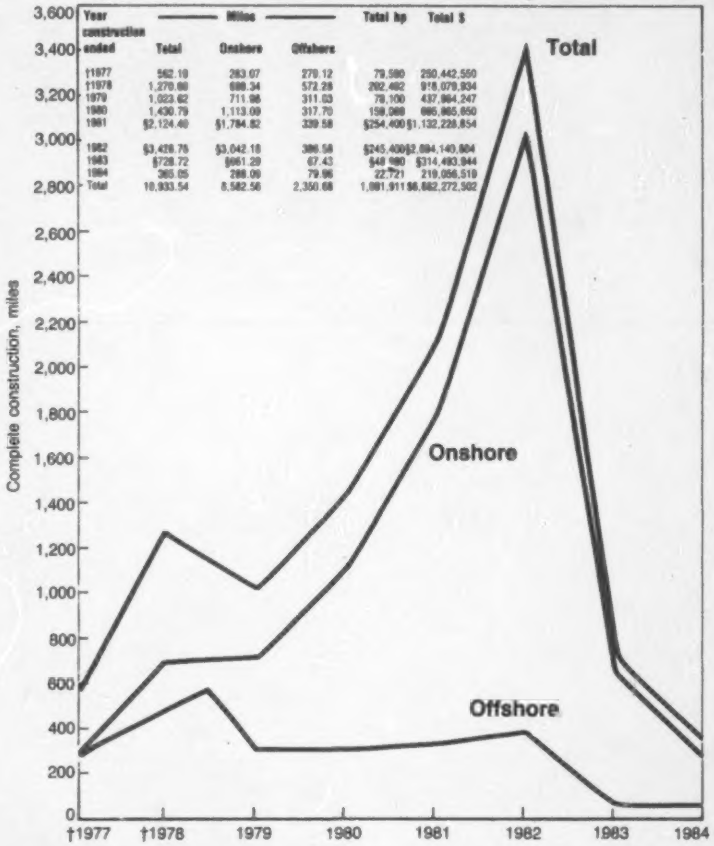
Line pipe and fittings account for slightly less than 30% for both crude-oil and products pipeline investment, while pump stations and equipment account for 19.89% of the investment in crude-oil pipelines and 17.25% for products pipelines.

Construction activity

As Fig. 1 shows, the costs of line pipe and fittings and of laying pipelines make up roughly 70% of the cost of a pipeline system. These elements of pipeline construction costs have shown minor escalation for the past few years, after rapidly increasing before 1982.

Fig. 5

U.S. gas-pipeline construction: 1977-1984*



Year construction ended	Miles Total	Miles Onshore	Miles Offshore	Total hp	Total $
†1977	562.19	283.07	279.12	79,580	250,442,550
†1978	1,270.62	698.34	572.28	292,482	918,079,934
1979	1,023.02	711.99	311.03	78,100	437,964,247
1980	1,430.79	1,113.09	317.70	159,060	695,865,650
1981	§2,124.40	§1,784.82	339.58	§254,400	§1,132,228,854
1982	§3,428.76	§3,042.18	386.58	§245,400	§2,094,140,804
1983	§728.72	§661.29	67.43	§48,980	§314,493,944
1984	365.05	285.09	79.96	22,721	219,056,519
Total	10,933.54	8,582.56	2,350.68	1,081,911	$6,062,272,502

*Mileage completed in each year for all diameter classifications.
†Excludes data for pipeline projects of less than 3 miles.
§Revised from FERC Staff Reports.
Source: U.S. FERC Staff Reports, 1979-82 & 1981-84.

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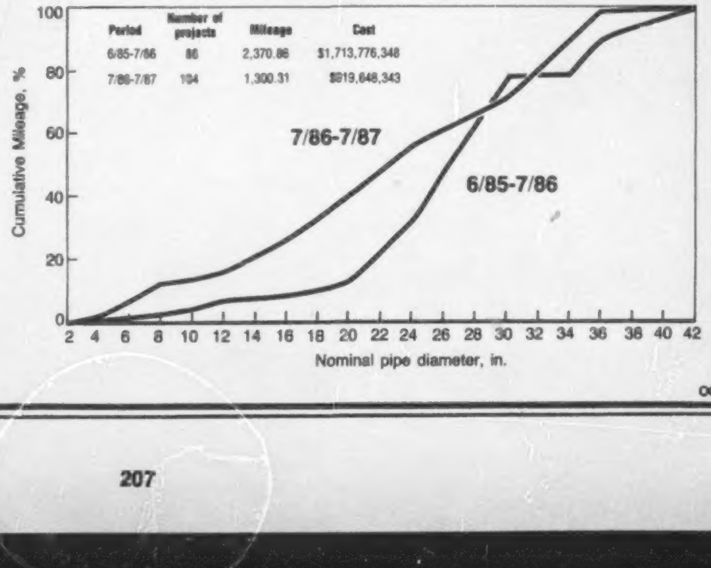
Fig. 6

Diameter distribution for onshore gas pipelines



Period	Number of projects	Mileage	Cost
6/85-7/86	86	2,370.86	$1,713,776,348
7/86-7/87	104	1,300.31	$819,648,343

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Table 4

10-year onshore construction cost trend

		Average cost, $/mile					Range, $/mile	
Size	**Year***	**R.O.W.**	**Material**	**Labor**	**Misc.**	**Total**	**Low**	**High**
8 in.	1987	20,032	55,430	75,568	30,581	181,611	151,193	652,036
	1986	14,763	44,703	63,102	32,958	155,527	137,033	193,846
	1985	3,141	28,144	47,317	16,283	94,884	64,203	228,866
	1984	22,339	49,974	175,733	74,086	322,132	223,767	540,655
	1983	6,244	48,392	89,600	23,088	167,324	159,940	178,020
	1982	8,996	46,002	67,950	31,769	154,717	73,596	572,926
	1981	8,119	34,860	23,528	20,884	87,391	55,981	109,078
	1980	8,247	39,040	102,839	13,036	163,162	149,926	200,554
	1979	1,189	40,692	63,518	14,951	123,350	50,374	581,916
	1978	1,590	32,123	30,554	8,660	72,927	61,614	109,956
12 in.	1987	26,018	81,675	161,790	67,404	336,826	166,473	669,332
	1986	43,656	94,786	243,533	101,683	483,657	186,180	1,201,356
	1985	26,582	74,620	106,447	46,164	253,813	131,765	767,548
	1984	23,035	147,750	211,783	93,481	476,050	338,872	608,685
	1983	5,135	91,492	73,042	20,754	190,423	177,050	218,265
	1982	10,536	84,972	102,390	32,173	230,071	130,252	669,227
	1981	3,855	71,444	65,613	11,861	152,773	55,981	369,018
	1980	2,610	54,235	41,089	14,111	112,045	78,428	901,282
	1979	1,590	46,062	47,283	7,121	102,056	96,822	158,185
	1978	6,697	55,362	61,919	13,830	137,808	(†)	(†)
16 in.	1987	34,775	109,042	187,216	68,857	399,890	190,946	§3,334,886
	1986	21,474	104,368	183,134	53,546	362,523	302,102	1,071,477
	1985	8,511	80,529	47,708	20,091	156,839	154,746	167,876
	1984	15,106	131,139	111,234	82,747	340,226	231,790	363,718
	1983	31,542	337,088	929,969	278,159	1,576,758	447,890	2,370,748
	1982	6,278	104,319	113,380	21,936	245,913	175,715	430,841
	1981	9,203	110,684	133,968	40,424	294,279	140,674	590,112
	1980	7,404	74,571	57,681	18,050	157,706	118,085	471,972
	1979	....	....	....	....	....	....	....
	1978	7,506	54,936	54,117	12,552	129,111	86,898	203,721
20 in.	1987	35,655	139,346	172,071	68,265	415,337	274,034	904,487
	1986	29,227	134,332	182,623	82,657	428,839	175,000	1,077,419
	1985	108,870	187,379	190,886	144,974	632,109	353,088	1,277,454
	1984	16,735	175,406	190,088	63,302	445,531	226,415	616,250
	1983	12,682	147,354	154,811	46,073	360,934	237,600	476,104
	1982	12,284	124,148	128,148	30,649	295,229	210,378	482,464
	1981	8,556	122,659	114,147	30,370	275,732	227,679	1,741,597
	1980	11,470	130,438	73,751	48,213	263,872	157,947	533,265
	1979	....	....	....	....	....	....	....
	1978	3,235	101,052	83,810	12,346	200,443	153,959	242,685
24 in.	1987	34,785	254,677	271,319	110,959	671,741	405,987	2,043,000
	1986	43,746	245,807	378,917	170,094	838,565	355,428	1,607,660
	1985	26,648	296,486	305,437	151,657	780,228	469,318	4,893,740
	1984	29,133	289,487	298,521	128,390	745,531	395,676	1,772,049
	1983	31,416	310,583	501,401	148,993	995,393	608,781	1,649,454
	1982	28,537	508,226	807,847	120,895	1,465,505	(†)	(†)
	1981	30,078	269,414	395,204	127,790	822,486	350,898	826,088
	1980	14,220	162,019	152,406	52,114	380,759	230,122	820,295
	1979	5,268	152,878	193,227	19,206	370,579	(†)	(†)
	1978	2,372	112,790	125,435	17,045	257,642	239,480	371,932
30 in.	1987	25,506	257,158	308,383	161,008	752,054	477,195	1,584,483
	1986	34,035	268,922	253,838	120,603	677,397	188,835	1,571,948
	1985	60,408	320,219	314,873	152,035	847,541	668,640	5,778,947
	1984	20,885	336,043	376,631	183,034	916,592	637,546	1,413,826
	1983	23,872	253,071	348,478	116,084	741,506	660,086	1,683,143
	1982	20,756	296,737	362,787	93,103	773,383	548,396	1,179,760
	1981	14,135	309,364	201,037	73,281	597,817	561,358	4,684,745
	1980	13,206	227,229	134,491	46,018	420,944	319,482	921,772
	1979	25,884	239,454	290,474	35,752	591,560	529,178	604,298
	1978	12,231	187,718	216,264	20,895	437,108	(†)	(†)
36 in.	1987	45,461	415,118	637,294	144,784	1,242,657	1,170,963	1,923,266
	1986	360,582	428,572	468,960	151,769	1,085,359	714,286	5,264,368
	1985	21,967	389,751	296,742	157,536	865,997	629,179	6,443,590
	1984	36,063	358,876	362,667	152,787	910,393	665,480	2,143,680
	1983	51,436	498,047	490,568	306,666	1,346,717	703,112	2,724,493
	1982	13,429	375,281	176,287	58,733	623,730	615,160	833,546
	1981	5,948	344,374	358,072	74,415	782,809	693,945	1,573,759
	1980	20,677	344,664	268,753	87,850	721,944	528,710	1,105,515
	1979	20,654	272,397	203,639	57,814	554,504	443,024	682,280
	1978	26,441	199,878	150,667	65,439	442,425	(†)	(†)

* 1978 based on completed costs reported to the U.S. FERC by fiscal year; 1979-1982 by calendar year. 1983-87 based on FERC construction-permit applications, by fiscal year. † One report only. § Involves a river crossing.

Table 5

Current compressor station costs

Location*	Horsepower	Equipment & material	Labor	Land	Misc.†	Total	$/hp
		$					
Pennsylvania	720	550,000	120,000	—	59,234	729,234	1,013
Florida	1,000	804,000	500,000	8,000	490,200	1,802,200	1,802
Florida§	1,000	683,000	425,000	6,000	414,700	1,528,700	1,529
Massachusetts§	1,000	464,500	279,200	—	247,294	990,994	991
Florida§	2,000	1,400,000	920,000	13,000	984,700	3,317,700	1,659
Florida§	2,000	1,400,000	920,000	13,000	984,700	3,317,700	1,659
Florida§	2,000	1,400,000	920,000	13,000	984,700	3,317,700	1,659
Florida§	2,000	1,650,000	1,145,000	13,000	1,074,900	3,882,900	1,941
Florida§	2,000	1,650,000	1,145,000	13,000	925,600	3,733,600	1,867
Massachusetts§	2,000	3,403,200	1,958,800	34,000	1,718,123	7,114,123	3,557
Oklahoma	2,400	2,117,000	666,000	—	317,333	3,100,333	1,292
Kentucky	3,000	4,427,700	2,235,600	125,000	2,185,700	8,974,000	2,991
New Jersey	3,000	3,463,000	1,282,000	500,000	878,078	6,123,078	2,041
Pennsylvania§	3,400	3,015,000	239,000	—	575,761	3,829,761	1,126
New York	3,500	3,425,500	2,031,600	320,000	1,537,924	7,315,024	2,090
New York	3,500	3,212,500	2,027,900	131,000	1,441,896	6,813,296	1,947
New York§	3,500	2,722,800	1,703,600	20,000	1,445,227	5,891,627	1,683
Pennsylvania	3,500	4,018,000	3,244,000	196,000	1,110,928	8,568,928	2,448
Alabama	4,000	2,485,000	1,450,000	—	486,000	4,421,000	1,105
Florida§	4,000	3,162,000	2,302,000	23,000	1,980,100	7,467,100	1,867
Florida§	4,000	2,090,000	1,352,000	20,000	1,470,500	4,932,500	1,233
Florida§	4,000	2,090,000	1,352,000	20,000	1,470,500	4,932,500	1,233
Ohio	4,000	2,325,000	1,257,000	139,000	384,000	4,105,000	1,026
Pennsylvania	4,000	4,018,000	3,244,000	196,000	1,165,346	8,623,346	2,156
Pennsylvania	4,000	4,227,000	2,616,000	240,000	852,604	7,935,604	1,984
Louisiana	4,800	1,048,000	170,000	—	1,133,000	2,351,000	490
Florida§	5,000	2,841,000	1,819,000	27,000	1,994,700	6,681,700	1,336
Florida§	5,000	3,350,000	2,137,000	31,000	2,350,200	7,868,200	1,574
Pennsylvania	8,000	9,170,850	3,800,880	—	1,393,788	14,365,518	1,796
Florida§	10,000	7,236,000	4,558,000	68,000	5,065,400	16,927,400	1,693
New York	10,000	9,400,000	3,200,000	175,000	2,992,163	15,767,163	1,577
Pennsylvania	10,000	9,400,000	2,900,000	100,000	2,727,172	15,127,172	1,513
Ohio	11,000	7,787,000	3,301,000	290,000	1,296,654	12,674,654	1,152
Pennsylvania	11,000	7,853,000	3,402,000	250,000	1,381,216	12,886,216	1,171
Pennsylvania	11,000	7,853,000	3,402,000	250,000	1,381,216	12,886,216	1,171
Pennsylvania	11,000	7,563,000	3,152,000	790,000	1,324,059	12,829,059	1,166
Kentucky§	12,000	1,862,300	975,900	—	482,691	3,320,981	277
Pennsylvania	22,000	14,895,000	5,775,000	350,000	2,413,688	23,433,688	1,065
Pennsylvania§	34,400	9,605,000	1,392,000	—	1,768,844	12,765,844	371
Total–all projects	*234,720	$160,067,350	$75,320,480	$4,374,000	$52,890,839	$292,652,669	$1,247
1986–report totals–onshore	178,747	$125,065,000	$48,851,500	$1,286,000	$44,346,701	$217,549,201	$1,217
1986–report totals–all projects	189,297	$139,276,432	$46,851,500	$1,286,000	$44,525,601	$231,939,533	$1,225

Source: U.S. FERC construction-permit applications, July 1, 1986, to June 30, 1987. * All projects onshore. † Genera[illegible]ludes engineering, supervision, surveying, interest, administration & overheads, contingencies, Afudc, and FERC fees. § Additions.

Cost trends. Table 4 lists a 10-year onshore-construction cost trend for natural-gas pipelines with diameters ranging from 8 to 36-in. The table's data are based on a mix of actual costs of completed pipeline construction and projected costs filed with construction permit (CP) applications to the FERC.

As the table reflects, the average cost per mile for any given diameter may fluctuate from one year to the next as projects' costs are affected by geographic location, terrain, population density, or other factors.

The cost-per-mile trends from 1985 to 1986 are marginally up, with four of seven diameter classifications showing increases. These increases are for 8, 16, 30, and 36-in. categories.

Yearly fluctuations in these figures are illustrated in construction figures for a 12-in. pipeline. These had leaped between 1984 and 1985 by 90.5%, from $253,813/mile to $483,657/mile, but fell back last year to $336,826/mile (−30.4%).

The generally upward trends in the cost-per-mile figures over the last 2 years may reflect the increase in proposed natural-gas pipeline construction evident in CP applications filed with the FERC from June 1, 1985, to June 30, 1987. As in any market, increased demand for pipeline construction services and materials will drive up costs.

More proposals. Table 2 lists 104 land-pipeline construction projects and 2 offshore for a total of 106, a 14% increase over 93 projects (86 land, 7 offshore) reported in last year's Pipeline Economics Report (OGJ, Nov. 24, 1986, pp. 40 and 43). Projects reported on last year had shown a 50% jump over projects reported the year before.

The onshore projects represent 1,300.31 miles of pipeline at an estimated price tag of more than $919.6 million, and the offshore pipeline projects represent 4.2 miles of offshore pipeline with an estimated price tag of slightly less than $3.5 million.

Total estimated costs for these projects, land and offshore, reach slightly more than $923 million.

Total costs of projects reported last year ran $1,811 million divided between $1,713 million for land and $97.9 million for offshore.

Although the actual number of projects was up, the number of miles proposed fell by 1,162.31 miles (47.1%) over what was proposed for the previous 13-month period.

Between the two periods, proposed land miles decreased 1,070.55 miles (−45.2%); offshore, by 91.76 miles (−95.6%). These figures point out the focus of the U.S. pipeline industry last year as it sought to increase capacity to serve Northeast markets. Of the land projects proposed, 57 are for the U.S. Northeast (West Virginia to New Hampshire).

Cost-per-mile figures may reveal more about cost trends than aggregate costs.

For proposed U.S. gas-pipeline projects in the 1986-87 period surveyed, the average onshore cost per mile was $707,253, compared with $722,850/mile for the 1985-86 period, a decrease of 2.2%.

For offshore projects, the 1986-87 figure was $825,395/mile compared to $1,020,095/mile for 1985-86. But the paucity of offshore projects makes unreliable any conclusions about yearly shifts in cost-per-mile averages.

Combined onshore and offshore

Table 6

Completed compressor-station costs—1984*

			Cost, $					
Location†	**Number of units**	**Total horsepower**	**Equipment & material**	**Labor**	**Engineering & supv.**	**Misc.§**	**Total cost**	**$/hp**
ONSHORE								
New reciprocating-unit stations								
Texas (F)	1	108	109,011	36,471	—	36,930	182,412	1,689
Oklahoma (F)	1	200	68,137	41,620	—	71,179	180,936	905
Texas (F)	1	500	274,297	160,537	—	66,379	501,213	1,002
Oklahoma (F)	1	520	188,275	136,890	—	31,818	356,983	687
Oklahoma (F)	1	521	706,407	177,730	262,083	176,151	1,322,371	2,538
Arkansas (F)	1	950	108,573	100,659	—	25,960	235,192	248
Alabama (F)	2	1,268	897,107	380,969	—	60,900	1,338,976	1,056
Texas (F)	3	1,800	1,224,952	596,324	—	109,256	1,930,532	1,073
Oklahoma (T)	3	3,300	2,495,575	502,415	890,808	1,614,992	5,503,790	1,668
W. Virginia (T)	3	3,300	4,614,600	2,187,400	—	1,009,200	7,811,200	2,367
Reciprocating-unit additions								
Louisiana (F)	1	46	20,784	14,327	—	5,980	42,091	915
Oklahoma (F)	1	450	521,749	227,508	—	37,827	787,084	1,749
Texas (F)	1	450	403,080	136,655	—	227,008	766,743	1,704
New Mexico (F)	1	1,100	330,183	193,772	—	93,411	617,366	561
New Mexico (F)	1	1,100	405,159	179,546	—	209,699	794,404	722
Kansas (F)	2	1,715	1,054,475	259,817	—	361,327	1,675,619	977
Oklahoma (F)	2	4,000	2,351,940	570,575	284,089	177,087	3,383,691	846
Turbine-driven centrifugal additions								
New York (T)	2	11,600	4,745,793	734,667	289,465	191,875	5,961,800	514
Total onshore	**28**	**32,478**	**$20,520,097**	**$6,637,882**	**$1,726,445**	**$4,507,979**	**$33,392,403**	**$1,028**
OFFSHORE								
New reciprocating-units stations								
Louisiana	1	1,100	342,446	357,554	—	21,840	721,840	656
Total offshore	**1**	**1,100**	**$342,446**	**$357,554**	—	**$21,840**	**$721,840**	**$656**
Total compressor-station completions—1984	29	33,578	$20,862,543	$6,995,436	$1,726,445	$4,529,819	$34,114,243	$1,106

Source: U.S. FERC Staff Report, "Cost of Pipeline and Compressor Station under Natural Gas Act Section 7(c) for the Years 1981 through 1984." * Reflects costs for projects completed in 1984, the most recent year for which data are available. † T = transmission station; F = field station; S = storage station. § Generally includes interest during construction, overheads, land, ROW, damages, contingencies, and other costs.

Table 7

Natural-gas pipeline transmission expenses*

	Expenses, $		Cost/mile, $		Cost/MMcf sold, $	
	1984-majors†	**1985-majors§**	**1984-majors†**	**1985-majors§**	**1984 majors†**	**1985-majors§**
Operation expenses						
Supervision and engineering	131,521,396	141,111,223	519.60	534.15	9.90	12.46
System control and load dispatching	25,744,727	28,003,796	101.70	106.00	1.96	2.47
Communication system expenses	22,680,380	25,198,795	89.60	95.39	1.72	2.22
Compressor station labor and expenses	241,754,444	241,167,595	995.00	912.90	18.38	21.29
Gas for compressor station fuel	938,899,424	748,735,039	3,709.10	2,834.21	71.38	66.09
Other fuel and power for compressor stations	61,143,396	62,883,011	241.50	238.03	4.65	5.55
Mains	193,277,540	194,353,906	763.50	735.69	14.69	17.16
Measuring and regulating station expenses	68,129,612	70,192,395	269.10	265.70	5.18	6.20
Transmission and compression of gas by others	1,668,917,320	1,472,161,326	6,590.00	5,572.61	126.88	129.95
Other transmission expenses	49,048,231	47,009,813	193.80	177.95	3.73	4.15
Rents	19,188,281	17,089,546	75.80	64.69	1.46	1.51
Total operation expenses	**3,420,304,751**	**3,047,906,445**	**13,511.80**	**11,537.32**	**260.03**	**269.05**
Maintenance expenses						
Supervision and engineering	33,302,063	38,445,814	131.60	145.57	2.53	3.39
Structures and improvements	25,785,236	26,126,983	101.90	98.90	1.96	2.31
Mains	83,272,664	90,064,519	329.00	340.92	6.33	7.95
Compressor station equipment	165,100,644	174,091,277	652.20	658.99	12.55	15.37
Measuring and regulating station equipment	14,480,791	13,635,384	57.20	51.61	1.10	1.20
Communication equipment	13,376,965	13,164,377	52.80	49.83	1.02	1.16
Other equipment	4,615,509	4,216,143	18.20	15.96	0.35	0.37
Total maintenance expenses	**339,933,872**	**359,754,497**	**342.90**	**1,361.78**	**25.80**	**31.76**
Total transmission expenses	**$3,760,238,623**	**$3,407,660,942**	**$14,854.70**	**$12,899.10**	**$285.83**	**$300.80**
Total miles of transmission pipeline	**253,135**	**264,178**				
Total natural gas sold, MMcf	**13,153,705**	**11,328,495**				

Source: Statistics of Interstate Natural Gas Pipeline Companies—1984 & 1985. U.S. Department of Energy. * U.S. interstate pipelines for calendar years 1984 & 1985. † 43 of 142 companies filing Form 2's for 1984 with the U.S. Federal Energy Regulatory Commission; defined as those interstate natural-gas pipeline companies that had combined gas sales for resale and gas transported (interstate) or stored for a fee that exceeded 50 bcf during 1984. §45 of 137 companies filing Form 2's or 2A's with the FERC for 1985; defined as per note to GAS COMPANIES, p. 64.

projects show an average cost of $707,634/miles for this year's coverage; for the 1985-86 period, the figure was $734,413/mile.

Cost components. Analyses of the four major categories of pipeline construction costs—material, labor, right-of-way and damages, and miscellaneous—can also indicate trends within each group. Miscellaneous generally includes engineering, supervision, contingencies, allowances for funds used during construction, administration and overheads, and FERC filing fees.

For the 106 projects surveyed for the 1986-87 period covered in this report, cost-per-mile data for the four categories are as follows:

- Material—Land, $237,513/mile; offshore, $177,381/mile; total, $237,320/mile.
- Labor—Land, $329,331/mile; offshore, $404,762/mile; total, $329,573/mile.
- R.O.W. and damages—Land, $33,720/mile; total, $33,720/mile.
- Miscellaneous—Land, $104,802/mile; offshore, $243,252; total, $105,248/mile.

Table 2 lists proposed pipelines in order of increasing diameter and increasing lengths within each pipeline diameter. The average cost per mile for the projects shows no clear-cut trend related to either length or geographic area.

In general, however, the cost per mile within a given diameter indicates that the longer the pipeline, the lower the cost per mile for construction.

Nonetheless, road, highway, and river crossings and marshy or rocky terrain each strongly affects pipeline construction cost.

Cost split. Fig. 2, derived from Table 2 for both onshore and offshore pipelines, shows the major cost-component split for pipeline construction cost.

For onshore pipelines, material—including line pipe, fittings, valves, coating, etc.—represents an average of 33.7% of the construction cost; labor, 46.7%.

For offshore pipelines, material represents 21.5% of the construction cost; labor, 49.0%. Thus, labor and material comprise 80.4% of the cost of constructing onshore pipelines and 70.5% of the cost for offshore pipelines.

Fig. 3 plots the average pipeline construction cost for onshore and offshore gas-pipeline construction projects listed in Table 2.

In general, costs per mile for both onshore and offshore pipelines rise with increasing diameter. An exception with onshore pipelines occurs for 12-in. pipelines.

Top 10 interstate natural-gas pipeline companies—1986

	Company	Mileage	Company	Sales, MMcf	Company	Net income, $1,000
1	Northern Natural Div. of Enron	23,474	Texas Eastern Transmission Co.	721,921	ANR Pipeline Co.	214,441
2	El Paso Natural Gas Co.	21,794	Natural Gas Pipeline Co. of America	519,388	El Paso Natural Gas Co.	152,128
3	Columbia Gas Transmission Corp.	18,807	Columbia Gas Transmission Corp.	476,870	Panhandle Eastern Pipe Line Co.	134,474
4	Tenneco Inc.	14,083	Northern Natural Division of Enron	474,516	Natural Gas Pipeline Co. of America	79,123
5	ANR Pipeline Co.	14,032	Tenneco Inc.	473,264	Colorado Interstate Gas Co.	69,284
6	KN Energy Inc.	12,896	El Paso Natural Gas Co.	404,298	Northern Border Pipeline Corp.	64,678
7	Panhandle Eastern Pipe Line Co.	12,693	Transcontinental Gas Pipeline Corp.	365,116	Arkla Inc.	63,372
8	Natural Gas Pipeline Co. of America	12,504	ANR Pipeline Co.	311,908	Texas Gas Transmission Corp.	58,745
9	Transcontinental Gas Pipeline Corp.	10,572	Consolidated Gas Transmission Corp.	269,254	Consolidated Gas Transmission Corp.	58,695
10	Texas Eastern Transmission Corp.	10,085	Southern Natural Gas Co.	256,737	Northern Natural Division of Enron	57,663
	Totals	150,940		4,273,273		$952,603
	Part of majors, %	58.9		92.1		78.8
	Part of all companies, %	53.5		45.1		57.8
	1985 totals	148,388		6,284,984		$1,478,887

Source: U.S. FERC Form 2: Annual Report for Major Natural Gas Companies, Dec. 31, 1986.

Top 10 interstate liquids-pipelines—1986

	Company	Mileage*	Company	Trunkline traffic, million bbl-mile	Company	$1,000
1	Amoco Pipeline Co.	12,234C	Colonial Pipeline Co.	668,625P	Exxon Pipeline Co.	314,227
2	Mobil Pipeline Co.	10,710C	Lakehead Pipe Line Co. Inc.	334,904P	Sohio Alaska Pipeline Co.	307,025
3	Exxon Pipeline Co.	†9,465C	Sohio Alaska Pipeline Co.	239,044C	BP Pipelines Inc.	157,004
4	Chevron Pipe Line Co.	7,708P	Exxon Pipeline Co.	168,734C	Colonial Pipeline Co.	132,044
5	Conoco Pipeline Co.	7,657C	ARCO Pipe Line Co.	160,982C	Amoco Pipeline Co.	92,090
6	Shell Pipe Line Corp.	7,159C	Amoco Pipeline Co.	139,019C	Mobil Pipeline Co.	63,999
7	Mid-America Pipeline Co.	§7,028P	Explorer Pipeline Co.	123,345P	Chevron Pipe Line Co.	57,641
8	Williams Pipe Line Co.	7,004P	Plantation Pipe Line Co.	122,520P	Southern Pacific Pipe Lines Inc.	56,772
9	ARCO Pipe Line Co.	†6,987C	Shell Pipe Line Corp.	107,744C	Lakehead Pipe Line Co. Inc.	51,784
10	Colonial Pipeline Co.	5,188P	Texas Eastern Transmission Corp.	86,611P	Shell Pipe Line Corp.	51,212
	Total	81,140		2,151,528		$1,283,798
	Part of all companies, %	47.7		62.1		62.5
	1985 totals	84,883		2,088,801		$1,466,711

Source: U.S. FERC Form 6: Annual Report of Oil Pipeline Companies, Dec. 31, 1986. * C = mostly or exclusively crude oil; P = mostly or exclusively product. † Includes 818 miles for Trans-Alaska Pipeline; to avoid duplication, the total includes this figure only once. § Excludes 1,097 miles of ammonia pipelines.

Similarly, construction cost trends for offshore projects published in previous OGJ Pipeline Economics Reports have shown a generally rising cost per mile with increasing diameter. Cost-trend implications from projects reported here for the 1986-87 period must be discounted because there are only two.

Compressor-station costs make up another major cost element of natural-gas pipelines. Table 5 lists 39 onshore and no offshore compressor-station projects. CP applications for these projects were filed with FERC between July 1, 1986, and June 30, 1987.

Costs for new onshore compressor stations range from a low of $277/hp for a 12,000-hp station in Kentucky to a high of $3,557/hp for a 2,000-hp station in Massachusetts. Cost-per-horsepower figures show no particular correlation with compressor-station size or location.

Fig. 4 shows the cost split for onshore compressor stations based on data in Table 5. The cost of equipment and materials represents 54.7% of the cost of a compressor station, while installation labor amounts to about 25.7%.

Completed projects. One factor in compressor-station costs is the type of driver specified. Table 6 is a compilation from the most recent FERC staff report on costs of compressor stations completed in 1984. It is broken down by the type of prime mover.

Of the 21 compressor stations completed in 1984 and their costs reported to the FERC, 10 of the new stations were onshore reciprocating-unit stations. And 2 new reciprocating stations offshore were completed.

For the period, no new turbine-driven centrifugal units onshore were reported.

Of compressor-station additions onshore, 7 were reciprocating units; 1 turbine-driven centrifugal addition was reported.

Fig. 5, taken from FERC staff reports for 1979-82 and 1981-84, shows the natural-gas pipeline mileage and compressor-station horsepower installed for 1977 through 1984.

It gives total pipeline mileage installed onshore and offshore, along with the total expenditures for the 8-year period. Also plotted is pipeline mileage completed in each year from 1977 through 1984, both onshore and offshore.

As the curves show, offshore construction mileage dropped after 1978, remained essentially flat through 1982, dropped off again in 1983, and was flat through 1984.

Onshore construction on the other hand escalated steeply through 1982 then dropped precipitously for 1983, slowing slightly for 1984.

During the 8-year period, 10,933.54 miles of pipeline construction were completed of which 8,582.86 miles were constructed onshore, and 2,350.68 miles were constructed offshore.

Total compression horsepower installed during the period was 1,090,911 hp. Expenditures totaled almost $6.7 billion for pipeline and compressor-station construction.

Size distribution. Another element affecting the capital expenditures for pipeline construction is the distribution of the diameter and mileage.

Fig. 6's curves reflect the cumulative percentage of mileage for pipeline diameters 2 to 42-in. for June 1, 1985, to June 30, 1986, and for 4 to 42-in. for July 1, 1986, to June 30, 1987.

As those curves show, more than 77% of the pipeline construction proposed for the 1986-87 period was for pipeline diameters of 30, 34, 36, and 42 in.

CP applications for the 1985-86 period show that more than 71% of proposed construction was for 30, 36, and 42-in. pipeline diameters.

As an aid in determining the detailed costs for each major element in pipeline and compressor-station construction for the pipelines and compressor stations, a number of tables covering specific projects are included in this report (pp. 50-56). These

ONSHORE PIPELINE PROJECTS

21.3 miles of 6-in. replacement, Colorado

Item	Cost
Right-of-way	$42,000
Damages	58,000
Survey	3,000
Material	$406,000
Labor	$385,000
Engineering and inspection	$ 69,000
Administrative overhead	116,000
Fee for legal and other services	21,000
Total	$1,100,000
Cost/mile	$51,643

33 miles of 30-in. loop, Florida

Item	Cost
Right of way and land	$ 462,300
Material	7,831,300
Construction	5,831,300
Miscellaneous	
Other	899,900
Escalation	1,036,800
Contingency	1,419,900
IDC	308,500
Filing fee	1,300
Total	$17,328,000
Cost/mile	$525,091

17.53 miles of 36-in., Ohio and Pennsylvania

Item	Cost
Route and environmental survey	$187,000
R.O.W. & damages	561,000
MATERIAL	
36-in. X 0.385-in. W.T. GR X65	3,400,000
36-in. X 0.462-in. W.T. GR X65	1,040,000
36-in. X 0.554-in. W.T. GR X65	897,000
36-in. X 0.693-in. W.T. GR X65	42,000
Coating	713,000
Other material	1,661,000
Installation	
Contract portion	$10,450,000
Company portion	1,036,000
Contingency	$999,000
Misc.	$1,467,000
Total	$22,453,166
Cost/mile	$1,280,842

8 miles of 30-in. loop, Florida

Item	Cost
Right-of-way and land	$ 108,700
Material	1,853,500
Construction	1,600,700
Miscellaneous	
Other	221,100
Escalation	269,400
Contingency	369,000
IDC	80,200
FERC filing fee	300
Total	$4,502,900
Cost/mile	$562,863

11.9 miles of 16-in. lateral, Florida

Item	Cost
Right of way and land	$ 256,900
Material	1,248,900
Construction	1,322,200
Miscellaneous	
Other	176,000
Escalation	90,100
Contingency	281,600
IDC	61,200
FERC filing fee	300
Total	$3,437,200
Cost/mile	$288,840

7.1 miles of 8-in. lateral, Florida

Item	Cost
Right-of-way and land	$ 150,000
Material	426,200
Construction	600,100
Miscellaneous	
Other	68,500
Escalation	37,300
Contingency	116,700
IDC	25,400
Filing fee	100
Total	$1,424,300
Cost/mile	$200,606

3.8 miles of 2-in. replacement, Nebraska

Item	Cost
Right-of-way	$ 5,000
Damages	8,000
Material	$34,000
Labor	$34,000
Engineering and inspection	$ 7,000
Administrative overhead	11,000
Fee for legal and other services	1,000
Interest during construction	
Total	$100,000
Cost/mile	$26,316

Onshore pipeline projects (continued)

21.6 miles of 24-in. replacement, Louisiana

Item	Cost
Right-of-way and cost of acquisition	$684,800
Regulator station site	2,500
MATERIAL	
Pipe	
24-in. O.D. X 0.281-in. W.T. API 5LX60	$2,776,300
24-in. O.D. X 0.344-in. W.T. API 5LX60	394,600
24-in. O.D. X 0.406-in. W.T. API 5LX60	680,600
Coating material—enamel	384,800
Meter and regulator facilities	219,100
Misc. material	886,400
INSTALLATION	
Clearing, pipe ditch, welding, laying, back filling, valve settings, and all other operations	$2,985,200
Engineering, surveying, and mapping	$63,800
Administrative and field	
Engineering and inspection	$1,694,600
General overhead	$797,200
Interest	$501,500
FERC fee	$4,792
Total	**$12,076,192**
Cost/mile	**$564,308**

5.61 miles of 20-in. loop, Pennsylvania

Item	Cost
Route and environmental survey	$ 54,000
R.O.W. & damages	180,000
MATERIAL	
20-in. X 0.318-in. W.T. GR B	$607,000
20-in. X 0.381-in. W.T. GR B	88,000
20-in. X 0.458-in. W.T. GR B	9,000
Coating	146,000
Other material	446,000
INSTALLATION	
Contract portion	$2,651,000
Company portion	354,000
Contingency	$227,000
Misc.	$312,174
Total Cost	**$5,074,174**
Cost/mile	**$904,487**

51.9 miles of 30-in., Alabama

Item	Cost
Permits, R.O.W., and damages	$729,529
R.O.W. acquisition	152,773
Temporary WS/damages	475,740
MATERIAL	
Pipe 30-in. X 0.344-in. W.T. X-60	$8,651,897
Pipe 30-in. X 0.406-in. W.T. X-60	451,776
Pipe 30-in. X 0.500-in. W.T. X-60	142,200
Coating	960,338
Fittings	41,200
Miscellaneous material	158,618
Casing 36-in. X 0.35-in. W.T.	26,775
Freight and handle pipe	1,259,631
Mainline valves	60,000
Valve operators	31,000
Sales tax (5.0%)	539,172
INSTALLATION	
Pipeline	$8,375,040
Concrete weight	626,080
Casing	93,750
Clearing trees	$1,116,672
Mainline valves	140,000
Construction support	$724,608
Engineering	703,463
Gas pack	50,000
Escalation to 1988 construction	$1,022,410
Contingency	2,657,328
Total	**$29,240,000**
Cost/mile	**$563,391**

7.5 miles of 10.75-in. replacement, Massachusetts

Item	Cost
Total right-of-way	$360,000
Preliminary survey	21,000
MATERIAL	
10.75-in. O.D. × 0.279-in. W.T. GR B	$481,100
Pipe coating	62,200
Casing	14,300
Mainline valve assembly with tie-over	48,000
Misc. and freight	43,400
INSTALLATION	
Lay, string, and test	$1,320,700
Casing	87,600
Mainline valve assembly with tie-over	40,000
1-in. concrete coating field formed	10,100
Padding-Class 1	21,100
Mulch	70,400
River crossing	63,000
Performance bond	14,100
X-ray	33,700
Load gas	4,300
Other costs	
Company supervision and inspection	$87,000
Contingencies	83,000
Misc.	593,134
Total	**$3,458,134**
Cost/mile	**$461,086**

give detailed cost breakdown for each major component in a construction-cost estimate.

They represent cost information from FERC CP applications for the 1986-87 period surveyed. (Also see Table 5.

These detailed tables represent both a variety of onshore geographic locations in the U.S. and pipeline and compressor stations for both onshore and offshore facilities.

Transmission expenses. Once a natural-gas pipeline is laid and compressor stations constructed, operating costs become the next consideration.

As an aid in estimating this element (Table 7), transmission expenses for interstate gas pipelines for 1984 and 1985, have been included.

Its data are based on 253,135 miles of pipeline and 13,153,705 MMcf sold for 1984 majors and on 264,178 miles of pipeline and 11,328,495 MMcf of gas sold for 1985 majors.

- The highest component of transmission operating expenses is transmission and compression of gas by others: for majors in 1984, this component was $6,590/mile or $126.88/MMcf of gas sold; for majors in 1985, this component was $5,573/mile or $129.95/MMcf.
- The second highest cost component of transmission operating expense is gas for compressor-station fuel: for majors in 1984, $3,709.10/mile or $71.38/MMcf of gas sold; for majors in 1985, $2,834.21/mile or $66.09/MMcf.
- The highest cost component of maintenance expense covers compressor-station equipment: for 1984 majors, $652.20/mile or $12.55/MMcf sold; for major in 1985, $658.99/mile or $15.37/MMcf.
- The second highest cost component for maintenance is the maintenance of pipelines: for 1984 majors, $329/mile or $6.33/MMcf sold; for majors in 1985, $340.92/mile or $7.95/MMcf.
- As Table 7 shows, the highest component of transmission expense is operating expense: for 1984 majors, $13,511.80/mile or $260.03/MMcf of gas sold; for 1985 majors, $11,537.32/mile or $269.05/MMcf.
- Unit maintenance expenses for 1984 majors was $1,342.90/mile or $25.80/MMcf of gas sold; for 1985 majors, $1,361.78/mile or $31.76/MMcf.
- During 1984, major natural-gas pipeline companies spent more than $3,420 million for operation of natural-gas transmission pipelines and slightly less than $340 million for maintenance, for a total of more than $3,760 million for transmission of natural gas.

Onshore pipeline projects (continued)

20.08 miles of 24-in., New York

Item	Cost
Right-of-way	$ 12,000
Property damage	438,000
Survey	85,000
Environmental impact study	50,000
MATERIAL	
20.08 miles of 24-in. line pipe	$3,180,000
Coating and wrapping	660,000
Pipe transportation	283,000
Major valves and fittings	190,000
Misc.	150,000
CONSTRUCTION	
24-in. line pipe	$3,500,000
Radiograph	20,000
Engineering and inspection	175,000
Afudc	$364,042
Contingencies	$232,000
FERC fee	$17,490
Total	**$9,356,532**
Cost/mile	**$465,963**

50 miles of 20-in. loop, Louisiana

Item	Cost
Rights-of-way and damages	$1,280,000
MATERIAL	
Line pipe	
20-in. X 0.281-in. W.T. X60	$3,363,000
20-in. X 0.344-in. W.T. X60	626,400
20-in. X 0.500-in. W.T. X52	135,000
Other materials	
Corrosion coating	$594,000
Weight coating	96,300
Valves and fittings	270,000
Casing pipe	100,000
Cathodic protection	50,000
Misc.	55,000
INSTALLATION	
Contractor	
Install 20-in. pipeline	$4,488,000
Valve settings/crossovers	350,000
Survey and mapping	$316,800
Engineering and inspection	330,000
Misc.	$1,647,186
Total	**$13,701,686**
Cost/mile	**$274,034**

61.83 miles of 16-in. loop, Kentucky and Indiana

Item	Cost
Survey/mapping	$ 92,745
R.O.W. & damages	1,187,160
Environmental impact evaluation	60,095
MATERIAL	
Pipe, 16-in. X 0.250-in. W.T. API grade X60 ERW line pipe	$4,616,173
External coating, thin film epoxy	750,863
Block valve assembly	299,000
Pig trap assembly	99,000
Side valve assembly	27,850
Tie-in assembly, 14.85 miles	27,300
Tie-in assembly, 17.67 miles	22,300
Concrete weights	50,100
Road crossings	113,477
Cathodic protection	6,600
Miscellaneous material	120,337
INSTALLATION	
Pipe, 16-in. X 0.250-in. W.T. API Grade X60 ERW line pipe	$6,349,696
Block valve assembly	145,500
Pig trap assembly	28,200
Side valve assembly	19,000
Tie-in assembly, 14.85 miles	14,500
Tie-in assembly, 17.67 miles	21,400
Concrete weights	50,100
Rock trench	762,000
Road crossings	246,500
Cathodic protection	6,000
Gas loss	17,670
Company inspection	339,444
Field engineering and supervision	$452,000
Administrative overheads	531,300
AFUDC	591,000
Contingencies	852,700
Fee	4,843
Total	**$17,934,843**
Cost/mile	**$290,067**

5.50 miles of 42-in., New Jersey

Item	Cost
Route and environmental survey	$ 60,000
R.O.W. & damages	320,000
MATERIAL	
Pipe, 42-in. X 0.683-in. W.T. GR X60	$3,121,000
Pipe, 42-in. X 0.854-in. W.T. GR X60	236,000
Coating	291,000
Other material	628,000
INSTALLATION	
Contract portion	$6,222,000
Company portion	627,000
Contingency	$575,000
Misc.	$854,022
Total	**$12,934,022**
Cost/mile	**2,351,640**

36.18 miles of 36-in., Ohio, West Virginia, and Pennsylvania

Item	Cost
Route and environmental survey	$ 380,000
R.O.W., damages, & permits	1,158,000
MATERIAL	
36-in. X 0.385-in. W.T. GR X65	$9,560,000
36-in. X 0.462-in. W.T. GR X65	301,000
36-in. X 0.554-in. W.T. GR X65	464,000
Coating	1,491,000
Other material	2,505,000
INSTALLATION	
Contract portion	$20,372,000
Company portion	2,280,000
Contingency	$1,925,000
Misc.	$2,636,136
Total	**$43,072,136**
Cost/mile	**$1,190,496**

217.5 miles of 36-in., Pennsylvania

Item	Cost
Route and environmental survey	$2,114,000
R.O.W. & damages	10,198,000
MATERIAL	
36-in. X 0.385-in. W.T. GR X65	$36,087,000
36-in. X 0.462-in. W.T. GR X65	19,078,000
36-in. X 0.554-in. W.T. GR X65	11,772,000
36-in. X 0.600-in. W.T. GR X65	1,550,000
Coating	9,076,000
Other material	7,171,000
INSTALLATION	
Contract Portion	$121,650,000
Company Portion	7,989,000
Contingency	$11,335,000
Misc.	$16,664,378
Total Cost	**$254,684,378**
Cost/mile	**$1,170,963**

39.7 miles of 24-in. lateral, Florida

Item	Cost
Right-of-way and land	$ 538,100
Material	6,681,700
Construction	5,381,000
Miscellaneous	
Other	943,800
Escalation	964,400
Contingency	1,320,600
IDC	286,900
FERC filing fee	1,200
Total	**$16,117,800**
Cost/mile	**$405,990**

OFFSHORE PIPELINE PROJECTS

3.9 miles of 10-in., Louisiana

Item	Cost
MATERIAL	
Pipe	$420,000
Valves, fittings, other material	250,000
Contract Labor	$1,150,000
Engineering and design	$95,000
Construction supervision, inspection	95,000
Administrative and general overhead	60,000
Hazard expense and environmental permit	$37,900
Engineering design expenses	30,000
Survey and X-ray	70,000
Other construction expenses (diving inspection, etc.)	300,000
Contingency	$240,000
Afudc	40,000
FERC filing fee	12,100
Total	**$2,800,000**
Cost/mile	**$717,948**

0.3 miles of 6-in., Louisiana

Item	Cost
MATERIAL	
Pipe, externally coated	$30,000
Riser protector	15,000
Subsea assembly	30,000
INSTALLATION	
Lay and bury, set riser	$400,000
Subsea tie-in	80,000
Weather downtime	70,000
Survey of route	$11,000
Inspection (visual and X-ray)	14,000
Misc.	16,660
Total	**$666,660**
Cost/mile	**$2,222,200**

Majors for 1985 spent almost $3,048 million for operation expenses and nearly $360 million on maintenance.

Total expenditures by 1985 majors for operation and maintenance expenses reached $3,407.7 million.

- On a unit basis, the total 1984 transmission expense for majors was $14,854.70/mile or $285.83/MMcf; for 1985 majors, $12,899.10/miles or $300.80/MMcf of gas sold. ▪

COMPRESSOR FACILITIES

Add 3,500-hp turbine compressor, New York

Item	Cost
Site improvement	20,000
MATERIAL	
Turbine compressor	$1,474,000
HP-gas pipe, valves, fittings, and controls	336,800
Station pipe, valves, fittings, and controls	67,400
Concrete, reinforced	62,600
Tankage, pumps, etc.	18,900
Communications	63,000
Supervisory equipment	12,500
Fire detection and protection equipment	10,800
Electrical	52,100
HP-gas unit valve skid	223,000
HP-gas filter/separator	67,700
Misc., tax and freight	195,700
Buildings	138,300
INSTALLATION	
Installation-contract	$1,169,200
Performance bond	14,500
X-ray	19,900
Other costs	
Company supervision and inspection	$198,500
Contingencies	232,100
Misc.	$1,104,627
Total	**$6,591,627**
Cost/hp	**$1,883**

Install 4,000-hp reciprocating compressor, Alabama

Item	Cost
MATERIAL	
4,000-hp compressor unit	$2,000,000
Compressor unit foundation	40,000
Compressor bldg.	150,000
Suction and discharge piping	100,000
Auxiliary facilities	125,000
Electrical	50,000
Engineering and drafting	20,000
INSTALLATION	
4,000-hp compressor unit	$150,000
Compressor unit foundation	60,000
Compressor bldg.	465,000
Suction and discharge piping	200,000
Auxiliary facilities	225,000
Electrical	70,000
Engineering and drafting	280,000
Total	**$4,421,000**
Cost/hp	**$1,105**

Install 3,000-hp turbine compressor, Kentucky

Item	Cost
Research testing	$ 20,500
Site improvement	104,500
MATERIAL	
Turbine/Compressor unit	$1,841,400
HP gas pipe, valves, and fittings	230,500
Station pipe, valves, and fittings	175,400
Foundations	118,800
Tankage, pumps, etc.	33,100
Communications	35,700
Supervisory equipment	123,700
Fire detection and protection equipment	33,500
Electrical	155,000
HP gas unit valve skid	420,000
Other equipment	294,000
Misc., tax, and freight	319,700
Buildings	638,800
Water well	8,100
INSTALLATION	
Installation-contract	$2,190,900
Performance bond	17,100
X-ray	27,600
Other costs	
Company supervision and inspection	$ 278,700
Contingencies	353,000
Misc.	1,554,000
Total	**$8,974,000**
Cost/hp	**$2,991**

Install 3,500-hp turbine compressor, New York

Item	Cost
Site improvement	$320,000
MATERIAL	
Turbine/compressor unit	$1,384,500
HP gas pipe, valves, fittings	576,900
Station pipe, valves, fittings	144,200
Concrete foundtions	81,100
Communications	63,000
Supervisory equipment	55,000
Fire detection and protection equipment	10,400
Electrical	127,000
HP gas valve skid	214,000
HP gas filter, 300 mm	65,000
Fuel gas skid	92,500
Air compressor	8,300
Exhaust damper with controls	5,000
Hot water heating equipment	16,200
Generator, 100 kw	36,700
Misc., tax and freight	236,800
Buildings	308,900
INSTALLATION	
Installation-contract	$1,970,700
Performance bond	16,800
X-ray	44,100
Other costs	
Company supervision and inspection	$212,800
Contingencies	59,100
Misc.	$1,266,044
Total	**$7,315,044**
Cost/hp	**$2,090**

LIQUID PIPELINES

	Miles of pipeline				Deliveries, 1,000 bbl			Total trunkline traffic, Million bbl-miles*			Fiscal data, $1,000			
		Trunk												
Company	Gathering	Crude	Products	Total	Crude	Products	Total	Crude	Products	Total	Carrier property	Change	Operating revenue	Income
Acorn Pipeline Co.	—	—	—	—	3,431	—	3,431	—	—	—	3,380	10	973	354
Air Force Pipeline Co.	—	—	5	5	—	1,126	1,126	6	6	1	353	—	198	27
Algonquin Pipeline Co.	33	51	—	84	839	—	839	25	—	25	2,363	−178	694	157
Allegheny Pipeline Co.	—	—	603	603	—	11,375	11,375	—	3,982	3,982	28,258	408	6,706	1,608
Amerada Hess Pipeline Corp.	—	† 818	—	† 818	10,335	—	10,335	7,960	—	7,960	149,316	276	18,861	−1,102
American Petrofina Pipeline Co.	—	1,072	18	1,090	26,514	13,610	40,124	8,809	14	8,823	23,293	—	9,499	1,632
Amoco Pipeline Co.	2,228	7,633	2,373	12,234	359,303	146,610	505,913	130,358	8,661	139,019	545,219	12,095	215,373	92,090
ARCO Pipe Line Co.	1,635	†2,482	2,870	†6,987	410,353	127,273	537,626	150,700	10,282	160,982	2,402,467	14,681	778,054	272
Asamera Pipeline, Inc.	—	—	—	—	1,089	—	1,089	1	—	1	2,356	2,403	212	−356
Ashland Pipe Line Co.	501	787	—	1,288	95,305	—	95,305	59,648	—	56,648	100,199	4,190	12,363	40,443
Atlantic Pipeline Corp.	—	11	941	952	42,477	43,969	86,446	—	6,923	6,923	47,579	3,595	2,636	27,783
Attco NGL Pipeline Co. (1987)	—	—	—	—	—	—	—	—	—	—	—	—	—	
Badger Pipe Line Co.	—	—	330	330	—	58,621	58,621	3,607	3,607	—	25,056	306	2,600	12,219
Belle Fourche Pipeline Co.	1,155	759	—	1,914	29,909	—	29,909	3,342	—	3,342	53,464	—	16,574	7,465
Black Lake Pipe Line Co.	—	255	—	255	3,100	—	3,100	626	—	626	10,275	221	1,209	6,641
BP Pipelines Inc.	—	†818	—	†818	108,683	—	108,683	86,519	—	86,519	1,611,091	3,017	481,102	157,004
Buccaneer Pipe Line Co.	—	2	—	2	226	—	226	—	—	—	176	−24	34	−147

LIQUID PIPELINES — continued

	Miles of pipeline				Deliveries, 1,000 bbl			Total trunkline traffic, Million bbl-miles*			Fiscal data, $1,000			
		Trunk												
Company	Gathering	Crude	Products	Total	Crude	Products	Total	Crude	Products	Total	Carrier property	Change	Operating revenue	Income
Buckeye Pipe Line Co. (final)	—	—	3,310	3,310	—	224,441	224,441	—	29,566	29,566	354,626	4,608	102,619	28,270
Buckeye Pipe Line Co. L P	—	—	3,421	3,421	—	34,556	34,556	—	4,526	4,526	455,970	368,154	16,227	7,603
Buckeye Pipe Line Co., of Mich. Inc. (final)	—	160	—	160	25,567	5,642	31,209	3,077	144	3,221	15,197	536	8,252	2,856
Buckeye Pipe Line Co., of Mich. Inc. L P	—	160	—	160	2,659	558	3,217	320	15	335	38,063	15,571	967	312
Butte Pipe Line Co.	—	373	—	373	33,090	—	33,090	8,828	—	8,828	18,629	176	9,818	2,197
C&T Pipeline Inc.	—	—	—	—	—	16	16	—	2	2	351	—	8	-674
Calnev Pipe Line Co.	22	65	583	670	—	26,321	26,321	—	5,127	5,127	39,647	1,872	18,072	9,040
Cenergy Transmission Co.	—	—	—	—	10	—	10	—	—	—	866	—	63	-122
Chase Transportation Co.	—	—	706	706	—	17,197	17,197	—	12,313	12,313	38,466	398	10,335	6,151
Chevron Pipe Line Co.	2,021	2,437	3,250	7,708	328,332	235,774	564,106	23,139	44,528	67,667	503,564	-7,290	203,647	57,641
Chicap Pipe Line Co.	—	235	—	235	73,006	—	73,006	7,275	—	7,275	33,117	-7	7,348	1,669
Chisholm Pipeline Co.	—	—	203	203	—	15,530	15,530	—	3,153	3,153	19,697	-482	5,689	3,153
Ciniza Pipe Line Inc.	233	135	11	379	6,667	1,070	7,737	407	12	419	6,587	62	3,056	332
Citgo Pipe Line Co.	64	29	—	93	45,165	99	45,264	4,938	1	4,939	47,457	1,589	20,078	4,000
Cities Service NGL Pipe Line Co.	—	—	—	—	—	2,597	2,597	—	277	277	3,230	20	633	89
CKB Petroleum Inc.	—	—	—	—	1,726	—	1,726	90	—	90	4,757	—	4,747	1,191
Clarco Pipeline Co.	90	—	—	90	1,628	—	1,628	—	—	—	3,409	45	444	7
Coastal Pipeline Co.	—	—	—	—	—	11,823	11,823	—	701	701	6,524	6,523	—	3,464
CNG Pipeline Co.	—	—	—	—	1,697	—	1,697	—	—	—	4,141	-33	1,752	574
Cochin Pipeline System	—	—	1,197	1,197	—	14,340	14,340	—	13,404	13,404	240,080	-70	34,397	14,556
Collins Pipeline Co.	—	—	124	124	—	36,505	36,505	—	4,527	4,527	15,344	-40	4,527	1,221
Colonial Pipeline Co.	—	—	5,188	5,188	—	629,635	629,635	—	668,625	668,625	1,333,806	6,732	502,455	132,042
Conoco Pipeline Co. (formerly Pipe Line Co.)	3,983	1,555	2,119	7,657	207,700	52,617	260,317	15,387	8,679	24,066	190,140	12,084	83,805	38,268
Cook Inlet Pipe Line Co.	—	55	—	55	11,992	—	11,992	399	—	399	42,348	30	13,555	3,411
Crown-Rancho Pipe Line Corp.	7	—	—	7	9,494	—	9,494	2,245	—	2,245	2,224	—	2,332	1,690
Diamond Shamrock Refining & Markt. Co.	—	—	622	622	—	19,387	19,387	—	9,551	9,551	32,390	15	11,019	2,015
Dixie Pipeline Co.	—	—	1,303	1,303	—	34,500	34,500	—	17,082	17,082	74,795	655	41,723	9,500
Dome Pipeline Corp.	1	8	130	139	—	11,495	11,495	—	291	291	22,648	632	1,084	7,560
El Paso Frontera Corp.	—	—	—	—	403	—	403	44	—	44	1,378	—	628	219
Emerald Pipe Line Corp.	—	—	113	113	—	3,599	3,599	—	296	296	1,430	—	987	368
Enron Liquids Pipeline Co.	—	—	1,573	1,573	—	30,809	30,809	—	16,185	16,185	158,084	-353	40,659	6,937
Enterprise Pipeline Co.	—	—	98	98	—	5,107	5,107	—	501	501	20,189	20,189	4,039	2,223
Enterprise Products Co. of Mississippi	—	—	268	268	—	6,350	6,350	—	1,702	1,702	12,077	—	4,534	-3,355
Eureka Pipe Line Co.	783	6	—	789	3,246	—	3,246	2	—	2	17,049	—	8,128	853
Explorer Pipeline Co.	—	—	1,397	1,397	—	173,560	173,560	—	123,345	123,345	254,405	503	104,512	28,015
Exxon Pipeline Co.	1,895	†4,986	2,584	† 9,465	450,510	106,557	557,067	161,298	7,436	168,734	2,150,041	24,785	709,806	314,227
Farmland Industries Inc.	633	239	—	872	20,976	—	20,976	463	—	463	10,924	112	3,361	—
Four Corners Pipe Line Co.	283	1,207	24	1,514	101,097	30,655	131,752	10,934	63	10,997	157,795	9,079	40,353	4,014
Frontier Pipeline Co.	—	290	—	290	6,922	—	6,922	2,007	—	2,007	48,843	-24	13,843	—
G & T Pipeline Co.	—	30	—	30	219	—	219	7	—	7	5,142	—	1,167	409
Getty Pipeline Inc. (final)	—	199	368	567	23,867	21,796	45,663	912	1,131	2,043	45,684	1,832	10,372	6,487
Gulf Central Pipeline Co.	—	—	1,976	1,976	11,619	—	11,619	—	9,318	9,318	126,256	3,829	24,486	4,906
Hess Pipeline Co.	442	—	—	442	24,151	—	24,151	1,427	—	1,427	45,390	12	11,734	2,787
Howell Crude Oil Co.	—	6	—	6	945	—	945	—	—	—	1,313	—	489	1,269
Interstate Storage & Pipeline Corp.	—	—	23	23	—	1,682	1,682	—	43	43	2,993	62	1,318	145
Jayhawk Pipeline Corp. (final)	242	513	—	755	38,097	—	38,097	3,899	—	3,899	22,914	456	8,778	1,462
Jet Lines Inc.	—	—	111	111	—	10,832	10,832	—	580	580	12,704	339	4,199	729
Kaneb Pipe Line Co.	—	—	2,080	2,080	—	51,362	51,362	—	13,394	13,394	104,509	618	35,816	8,312
Kaw Pipe Line Co.	1,392	—	—	1,392	16,357	—	16,357	—	—	—	12,135	110	5,985	986
Kerr-McGee Pipeline Corp.	8	56	—	64	2,108	—	2,108	49	—	49	5,081	—	3,337	1,836
Kiantone Pipeline Corp.§	—	78	—	78	20,424	—	20,424	1,598	—	1,598	9,703	—	4,289	-165
Koch Pipelines Inc.	908	1,075	1,488	3,543	21,337	4,295	25,632	2,137	927	3,064	284,290	25,737	18,095	2,539
Kuparak Pipeline Co.	—	37	—	37	99,470	—	99,470	3,169	—	3,169	125,744	236	60,809	46,647
Lake Charles Pipe Line Co.	—	—	13	13	—	77,017	77,017	—	371	371	10,816	35	3,910	1,122
Lakehead Pipe Line Co. Inc.	—	2,612	—	2,612	423,286	—	423,286	334,904	—	334,904	496,830	37,607	194,219	51,784
Largo Co., The	—	—	—	—	1,425	—	1,425	44	—	44	12,641	35	1,728	424
Laurel Pipe Line Co.	—	—	344	344	—	30,800	30,800	—	4,926	4,926	45,485	-11,599	12,604	1,137
Locap Inc.	—	—	59	59	203,645	—	203,645	11,621	—	11,621	120,427	39	19,027	445
Marathon Pipe Line Co.	1,025	1,710	1,462	4,197	352,679	210,010	562,689	47,791	16,306	64,097	345,456	2,448	140,254	38,683
Mark Oil Pipeline Co.	1	—	—	1	377	—	377	§	—	§	923	-32	264	-19
McMoran Pipeline Co.	—	—	—	—	211	—	211	18	—	18	1,919	—	—	132
Mesa Transmission Co.	—	11	—	11	738	—	738	33	—	33	10,170	—	2,446	138
Mid-America Pipeline Co. (Mapco)	—	19	¶7,009	¶7,028	27,898	150,890	178,788	2,960	42,579	45,539	466,061	6,458	120,272	19,704
Mid-Valley Pipeline Co.	—	—	95	95	99,005	—	99,005	57,818	—	57,818	97,196	2,630	36,734	8,538
Midland Lea Inc.	—	101	275	376	404	—	404	21	—	21	20,325	—	—	-34
Milne Point Pipe Line Co.	11	—	—	11	4,708	—	4,708	—	—	—	26,857	184	8,992	4,820

LIQUID PIPELINES — continued

	Miles of pipeline				Deliveries, 1,000 bbl			Total trunkline traffic, Million bbl-miles*			Fiscal data, $1,000			
		Trunk												
Company	Gathering	Crude	Products	Total	Crude	Products	Total	Crude	Products	Total	Carrier property	Change	Operating revenue	Income
Minnesota Pipe Line Co.	—	510	—	510	70,312	—	70,312	17,930	—	17,930	67,787	-1,133	23,882	4,927
Mitco Pipeline Co.	9	—	—	9	139	—	139	—	—	—	2,105	—	90,120	-43
Mobil Alaska Pipeline Co.	—	†818	—	†818	27,235	—	27,235	21,683	—	21,683	397,742	708	123,738	46,932
Mobil Eugene Island Pipeline Co.	—	66	—	66	12,699	—	12,699	1,157	—	1,157	34,367	3,628	9,364	3,319
Mobil Pipe Line Co.	4,031	4,874	1,805	10,710	217,417	105,321	322,738	71,820	11,274	83,094	303,406	-195	166,013	63,999
National Transit Co.	213	—	—	213	550	—	550	§	—	§	3,624	—	1,568	180
Navajo Pipeline Co.	—	110	323	433	—	5,597	5,597	—	1,181	1,181	8,536	24	5,920	2,170
Northern Rockies Pipe Line Co.	—	—	—	—	468	—	468	—	—	—	1,049	—	186	122
NW Pipeline Inc.	—	—	—	—	2,354	—	2,354	222	—	222	6,379	632	2,436	1,629
Ohio Oil Gathering Corp.	747	—	—	747	4,504	—	4,504	—	—	—	10,741	344	8,586	475
Ohio River Pipe Line Co.	—	—	400	400	—	14,770	14,770	—	1,722	1,722	22,913	778	6,402	1,297
Oiltanking of Texas Pipeline Co.	—	19	—	19	32,489	—	32,489	338	—	338	11,279	—	3,583	1,952
Olympic Pipe Line Co.	—	—	391	391	—	85,879	85,879	—	15,674	15,674	58,067	280	26,151	6,126
Osage Pipe Line Co.	—	136	—	136	27,458	—	27,458	3,734	—	3,734	19,523	-67	5,205	1,011
Owensboro-Ashland Co.	—	296	—	296	69,690	—	69,690	18,462	—	18,462	45,822	1,425	11,646	2,221
Oxy Pipeline Inc. (1987)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Palomo Pipeline Co.	—	—	—	—	28,574	—	28,574	2,017	—	2,017	5,742	-7	3,146	1,098
Pennzoil Offshore Pipeline Co.	—	4	—	4	795	—	795	39	—	39	3,463	—	708	166
Phillips Alaska Pipeline Corp.	—	†818	—	†818	9,046	—	9,046	7,162	—	7,162	126,568	252	40,939	16,450
Phillips Pipe Line Co.	—	811	4,045	4,856	71,588	207,704	279,292	13,884	46,154	60,038	331,172	5,371	141,729	40,396
Pioneer Pipe Line Co.	—	—	301	301	—	12,355	12,355	—	2,983	2,983	12,946	158	6,516	1,780
Plantation Pipe Line Co.	—	—	3,158	3,158	—	194,000	194,000	—	122,520	122,520	296,646	4,271	119,711	28,522
Platte Pipe Line Co.	—	1,283	—	1,283	53,789	—	53,789	37,523	—	37,523	79,263	668	33,856	9,570
Pogo Offshore Pipeline Co.	—	—	—	—	3,640	—	3,640	378	—	378	9,387	13	2,240	795
Point Pedernales Pipeline Co. (1987)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Portal Pipe Line Co.	296	615	—	911	24,597	—	24,597	9,541	—	9,541	43,637	240	16,056	4,635
Portland Pipe Line Corp.	—	343	—	343	25,324	—	25,324	4,204	—	4,204	50,945	445	12,880	2,148
Santa Fe Pipeline Co.	—	—	924	924	—	31,100	31,100	—	14,377	14,377	55,990	830	19,481	6,752
Seminole Pipeline Co.	—	—	774	774	—	50,913	50,913	—	18,438	18,438	205,773	534	29,613	8,095
Shamrock Pipe Line Corp., The	646	318	580	1,544	32,951	20,060	53,011	1,655	2,781	4,436	34,191	1,087	14,244	1,178
Shell Pipe Line Corp.	2,039	4,703	417	7,159	420,047	114,891	534,938	103,523	4,121	107,744	460,324	11,007	149,826	51,212
Sohio Alaska Pipe Line Co.	1,081	766	208	2,055	393,629	91,613	485,242	228,689	10,355	239,044	3,387,791	13,483	1,057,078	307,025
Sonat Oil Transmission Inc.	—	42	—	42	1,107	—	1,107	11	—	11	5,553	—	1,045	178
Southcap Pipe Line Co.	—	—	—	—	46,739	—	46,739	28,099	—	28,099	53,587	-204	12,178	1,489
Southern Pacific Pipelines Inc.	—	—	2,810	2,810	—	293,039	293,039	—	37,121	37,121	266,248	28,246	129,100	56,772
Sun Oil Line Co. of Michigan	—	—	—	—	—	—	—	—	—	—	669	—	87	18
Sun Pipe Line Co.	381	439	1,749	2,569	94,938	99,647	194,585	2,486	11,770	14,256	132,240	12,692	61,469	10,965
Tecumseh Pipe Line Co.	—	205	—	205	3,782	—	3,782	514	—	514	15,270	-10	501	-376
Texaco-Cities Service Pipe Line Co.	—	34	—	34	31,100	—	31,100	1,064	—	1,064	36,308	7	4,976	1,906
Texaco Pipeline Inc. (1987)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Texas Eastern Transmission Corp.	—	—	3,389	3,389	—	150,940	150,940	—	86,611	86,611	434,247	9,548	116,998	—
Texas Pipeline Co. (final)	1,229	2,468	497	4,194	366,094	119,867	485,961	52,263	6,589	58,852	276,646	-8,957	109,645	32,972
Texas-New Mexico Pipe Line Co.	1,764	2,196	—	3,960	131,372	—	131,372	18,719	—	18,719	89,651	56	37,012	9,057
Total Pipeline Corp.	193	583	97	873	65,683	16,262	81,945	11,031	1,395	12,426	46,871	4,727	11,882	-242
Trans Mountain Pipe Line Corp.	—	64	—	64	8,669	—	8,669	455	—	455	7,042	67	2,731	1,014
Trans-Ohio Pipeline Co.	—	—	133	133	—	12,441	12,441	—	478	478	13,843	—	3,610	1,296
Transco Terminal Co.	—	—	—	—	270	—	270	—	—	—	3,268	297	432	90
Unocal Pipeline Co.	799	†1555	16	†2370	91,098	22,656	113,754	23,221	274	23,495	217,710	88	71,961	23,518
Wascana Pipeline Co. (final)	—	—	—	—	—	—	—	—	—	—	2,078	—	—	-144
Wesco Pipe Line Co. (final)	678	632	—	1,310	73,939	—	73,939	5,582	—	5,582	81,578	3,381	20,154	2,935
West Emerald Pipe Line Corp.	—	296	—	296	—	2,044	2,044	—	467	467	11,843	-88	1,001	98
West Shore Pipe Line Co.	—	321	—	321	—	68,111	68,111	—	8,453	8,453	34,544	251	18,015	4,511
West Texas Gulf Pipe Line Co.	—	579	—	579	107,446	—	107,446	45,045	—	45,045	46,149	172	27,325	9,383
Western Oil Transportation Co. Inc.	428	—	—	428	8,436	—	8,436	—	—	—	31,187	36	4,217	2,881
White Shoal Pipeline Corp.	7	—	—	7	4,798	—	4,798	213	—	213	2,617	-6	483	98
Williams Pipe Line Co.	—	82	6,922	7,004	5,246	180,256	185,502	3,028	51,915	54,943	515,502	-29,609	146,914	19,867
Wolverine Pipe Line Co.	—	—	620	620	—	81,121	81,121	—	10,411	10,411	72,114	540	25,190	5,965
Wyco Pipe Line Co.	—	—	677	677	—	20,777	20,777	—	3,580	3,580	26,849	362	15,176	4,310
Yellowstone Pipe Line Co.	—	—	749	749	—	22,517	22,517	—	7,686	7,686	28,821	221	14,223	3,842
1986 Totals	**34,209**	**54,153**	**81,652**	**170,014**	**6,286,433**	**4,715,889**	**11,082,322**	**1,893,021**	**1,573,432**	**3,466,473**	**22,383,790**	**644,700**	**7,287,062**	**2,051,372**
1985 Totals	**35,021**	**55,844**	**80,536**	**171,401**	**6,238,731**	**4,505,992**	**10,744,723**	**1,842,013**	**1,499,791**	**3,341,804**	**21,605,239**	**680,285**	**7,460,847**	**2,430,845**

Source: U.S. FERC Form 6's: Annual Report of Oil Pipeline Companies, Dec. 31, 1986. *Some barrel-mile data are provided by the American Petroleum Institute, Policy Analysis Dept., Washington, D.C. †Mileage represents or includes Trans-Alaska pipeline and is included in total only once to avoid duplication. §Fewer than 1 million bbl-miles. ¶Excludes 1,097 miles of ammonia pipeline.

GAS PIPELINES

Company	Miles of pipeline				Total compressor stations			Total sales, MMcf	Fiscal data, $1,000			
	Transmission	Field	Storage	Total	Transmission	Other	Total		Gas plant	Additions	Operating revenues	Net income
Alabama-Tennessee Natural Gas Co.	298	—	—	298	2	—	2	24,679	1,513	—	92,753	3,831
Algonquin Gas Transmission Co.*	962	—	—	962	5	—	5	156,323	305,717	55,261	553,083	11,258
Algonquin LNG Inc.	—	—	—	—	—	—	—	—	9	—	4,393	377
American Distribution Co.	38	—	—	38	—	—	—		7,628	6	13,884	3,056
ANR Pipeline Co.*	8,638	2,599	2,795	14,032	48	61	109	311,908	2,485,943	62,217	1,704,012	214,441
ANR Storage Co.	—	—	25	25	3	—	3	—	121,358	408	35,276	9,776
Arkansas Oklahoma Gas Corp.	368	185	—	553	†12	—	†12	11,146	53,820	6,810	41,570	2,152
Arkla Inc.*	5,952	3,758	—	9,710	†336	—	†336	140,084	1,328,499	102,335	699,759	63,372
Associated Natural Gas Co.	587	—	—	587	—	—	—	9,397	41,335	2,177	44,079	856
Bayou Interstate Pipeline System	5	—	—	5	—	—	—	982	49	7	1,950	−14
Bear Creek Storage Co.	—	—	25	25	—	2	2	—	144,881	101	48,487	22,031
Black Marlin Pipeline Co.	65	—	—	65	—	—	—	52,891	21,036	147	3,156	441
Blue Dolphin Pipeline Co.	49	—	—	49	—	—	—	—	7,496	—	172	−523
Bluefield Gas Co.	—	—	—	—	—	—	—	873	2,174	34	5,213	−51
Boundary Gas Inc.	—	—	—	—	—	—	—	13,344	—	—	34,801	—
Canyon Creek Compression Co.	1	—	—	1	1	—	1	—	22,179	−62	7,958	1,119
Caprock Pipeline Co.	43	11	—	54	1	2	3	13,961	5,099	2	1,189	23
Carnegie Natural Gas Co.	258	920	—	1,178	7	6	13	12,646	94,385	6,140	56,105	4,395
Chandeleur Pipe Line Co.	174	—	—	174	—	—	—	—	20,769	27	1,155	−488
Cimarron Transmission Co.	—	41	—	41	—	—	—	2,116	1,541	36	3,616	34
Colorado Interstate Gas Co.*	2,728	3,131	235	6,094	26	35	61	137,463	707,732	12,162	553,344	69,284
Columbia Gas Transmission Corp.*	10,924	6,635	1,248	18,807	113	66	179	476,870	2,170,530	47,412	2,405.705	3,836
Columbia Gulf Transmission Co.*	4,251	—	—	4,251	13	26	39	—	1,054,446	14,827	219,523	26,959
Columbia LNG Corp.	88	—	—	88	—	—	—	—	202,085	—	12,070	546
Commercial Pipeline Co. Inc.	75	—	—	75	—	—	—	200	903	1	788	1
Consolidated Gas Transmission Corp.*	3,515	4,181	522	8,218	43	26	69	269,254	1,391,727	41,282	1,139,120	58,695
Consolidated System LNG Co.	112	—	—	112	—	—	—	—	267,335	−51	15,948	−380
Distrigas of Mass. Corp.	—	—	—	—	—	—	—	—	48,819	273	22,654	−395
East Tennessee Natural Gas Co.*	1,023	—	—	1,023	12	1	13	62,956	90,000	1,621	217,092	5,433
Eastern Shore Nat. Gas Co.	—	—	—	—	—	—	—	—	14,130	2,477	1,630	1,590
El Paso Natural Gas Co.*	10,924	10,852	18	21,794	93	29	122	404,298	2,546,849	104,532	1,823,246	152,128
Enserch Corp.	7,768	2,050	92	9,910	23	29	52	240,676	1,016,042	57,181	1,046,220	26,875
Equitable Gas Co.	525	1,497	—	2,022	—	—	—	53,315	553,095	32,776	330,363	54,727
Florida Gas Transmission Co.*	4,359	—	—	4,359	20	—	20	216,878	491,779	8,400	540,329	20,062
Freeport Interstate Pipeline Co.	9	—	—	9	—	—	—	—	—	—	38	2
Gas Gathering Corp.	—	32	—	32	—	—	—	77	1,556	43	486	2
Gas Transport Inc.	—	108	—	108				2,957	3,859	20	12,455	1,181
Gasdel Pipeline System Inc.	3	—	—	3	—	—	—	—	13,770	162	3,018	717
Glacier Gas Co.	34	3	—	37	2	—	2	420	2,334	—	405	40
Granite State Gas Trans. Inc.	57	—	—	57	1	—	1	31,982	4,096	894	115,727	127
Great Lakes Gas Transmission Co.*	1,321	—	—	1,321	14	—	14	31,390	535,219	8,250	281,982	30,288
Great Plains Natural Gas Co.	65	—	—	65	—	—	—	4,223	14,883	705	18,371	653
Hampshire Gas Co.	—	18	—	18	—	—	—	—	8,774	35	2,385	546
High Island Offshore System*	203	—	—	203	1	—	1	—	370,096	41,157	67,464	7,379
Honeoye Storage Corp.	11	19	—	30	—	3	3	48	8,754	17	2,099	325
Indiana Utilities Inc.	21	—	—	21	—	—	—	322	1,771	125	1,604	116
Inland Gas Co. Inc.	128	395	—	523	—	5	5	4,589	23,034	148	17,241	840
Inter-City Minnesota Pipelines Ltd	66	—	—	66	—	—	—	—	3,331	62	19,317	125
Interstate Power Co.	—	—	—	—	—	—	—	22,575	36,816	2,134	294,112	23,056

GAS PIPELINES — continued

Company	Miles of pipeline				Total compressor stations			Total sales, MMcf	Fiscal data, $1,000			
	Transmission	Field	Storage	Total	Transmission	Other	Total		Gas plant	Additions	Operating revenues	Net income
Iowa Public Service Co.	—	—	—	—	—	—	—	33,939	91,090	5,267	350,936	34,351
Iowa-Illinois Gas and Eiectric Co.	—	—	—	—	—	—	—	59,436	177,036	4,485	538,382	57,761
Jackson Underground Storage Project	—	—	—	—	—	—	—	—	17,624	45	—	—
Jupiter Energy Corp.	—	—	—	—	—	—	—	7,700	2,434	—	78	−57
K N Energy Inc.*	9,810	3,065	21	12,896	30	71	101	71,783	446,310	54,099	279,316	8,622
Kentucky-West Va. Gas Co.	77	2,080	—	2,157	7	6	13	17,484	65,597	3,470	81,399	6,805
Lawrenceburg Gas Transmission Corp.	6	—	—	6	—	—	—	2,242	455	—	9,568	−29
Lone Star Gathering Co.	80	7	—	87	—	—	—	—	2,753	—	382	71
Louisiana-Nevada Transit Co.	78	—	—	78	—	—	—	3,700	2,396	66	7,647	744
Marengo Corp.	—	—	—	—	—	—	—	499	48	—	1,760	99
Michigan Consolidated Gas Co.*	2,285	64	112	2,461	15	8	23	249,703	1,425,587	64,236	1,448,512	48,700
Michigan Gas Storage Co.*	562	—	148	710	1	1	2	20,726	53,749	284	134,625	1,732
Michigan Power Co.	—	—	—	—	—	—	—	18,792	53,097	3,385	131,312	3,632
Mid-Louisiana Gas Co.	409	—	—	409	—	—	—	20,851	82,755	562	55,622	2,921
Midwestern Gas Transmission Co.*	903	—	10	913	15	1	16	144,513	172,114	6,979	587,953	15,085
MIGC Inc.	171	10	—	181	3	2	5	3,304	12,603	1,284	12,535	508
Miss. River Transmission Corp.*	1,968	169	74	2,211	15	6	21	144,174	402,827	12,198	480,073	7,911
Mountain Fuel Resources Inc.*	1,532	785	50	2,367	14	33	47	67,076	348,683	8,437	310,750	20,168
National Fuel Gas Distribution Corp.	677	336	—	1,013	—	2	2	139,800	607,008	32,539	792,837	22,183
National Fuel Gas Supply Corp.*	1,420	1,531	443	3,394	18	5	23	148,275	268,352	11,572	560,458	18,455
Natural Gas Pipeline Co. of America*	10,453	1,756	295	12,504	75	57	132	519,388	2,389,095	45,051	2,013,363	79,123
Northern Natural Division of Enron Corp.*	15,418	7,848	208	23,474	53	68	121	474,516	2,599,887	15,548	1,908,081	57,663
North Penn Gas Co.	572	279	—	851	—	1	1	13,853	42,580	2,842	61,221	170
Northern Border Pipeline Co.*	824	—	—	824	2	—	2	—	1,294,610	647	247,828	64,678
Northwest Alaskan Pipeline Co.*	—	—	—	—	—	—	—	163,376	—	—	428,728	−1,112
Northwest Pipeline Corp.*	3,544	3.477	7	7,028	29	33	62	190,518	1,338,997	20,842	794,329	50,378
Ohio River Pipeline Corp.	24	—	—	24	—	—	—	5,961	3,664	13	20,508	95
Orange & Rockland Utilities Inc.	—	—	—	—	—	—	—	21,049	117,180	6,438	424,611	40,985
Overthrust Pipeline Co.*	89	—	—	89	—	—	—	—	63,001	7	9,071	1,642
Ozark Gas Transmission System	—	—	—	—	—	—	—	—	145,729	491	27,726	1,822
Pacific Gas Transmission Co.*	799	42	—	841	12	1	13	242.099	405,631	9,203	640,999	16,961
Pacific Interstate Offshore Co.	—	—	—	—	—	—	—	25,622	12,014	—	80,914	965
Pacific Interstate Trans. Co.	351	—	—	351	2	—	2	98,006	62,960	4,416	342,779	2,523
Pacific Offshore Pipeline Co.	—	—	—	—	—	—	—	8,198	145,691	—	67,561	6,862
Panhandle Eastern Pipeline Co.*	6,676	5,912	105	12,693	68	66	134	243,307	1,503,062	23,715	1,291,803	134,474
Panmark Gas Co.	—	—	—	—	—	—	—	—	—	—	140	338
Pelican Interstate Gas System	85	—	—	85'	—	—	—	—	11,190	87	1772	48
Penn Jersey Pipeline Corp.	4	—	—	4	—	—	—	—	234	—	20	31
Penn York Energy Corp.	—	—	33	33	—	2	2	—	51,010	701	24,868	5,268
Pennsylvania & Southern Gas. Co.	—	—	—	—	—	—	—	4,641	17,266	969	24,527	224
Phillips Gas Pipeline Co.	153	—	—	153	—	—	—	18,333	48,708	768	54,643	3,858
Point Arguello Natural Gas Line (1987)*	—	—	—	—	—	—	—	—	—	—	—	
Raton Gas Transmission Co.	21	—	—	21	—	—	—	1,159	274	18	4,301	126
Ringwood Gathering Co.	43	273	—	316	—	2	2	6,035	10,214	90	15,137	346
Sabine Pipe Line Co.	172	—	—	172	—	—	—	—	37,377	−5	7,706	2,524
Seagull Interstate Corp.	6	5	—	11	—	—	—	—	6,233	115	1,953	148
Sea Robin Pipeline Co.*	420	—	—	420	2	2	4	57,949	251,890	41	208,340	13,474
Shenandoah Gas Co.	82	—	—	82	—	—	—	4,100	14,852	1,056	19,453	841

GAS PIPELINES — continued

Company	Miles of pipeline				Total compressor stations			Total sales, MMcf	Fiscal data, $1,000			
	Transmission	Field	Storage	Total	Transmission	Other	Total		Gas plant	Additions	Operating revenues	Net income
South County Gas Co.	—	—	—	—	—	—	—	402	3,088	249	2,846	194
South Georgia Natural Gas Co.	767	—	—	767	2	—	2	14,388	23,085	206	59,720	510
South Penn Gas Co.	6	—	—	6	—	—	—	346	622	26	1,640	13
Southern Energy Co. (LNG)	—	—	—	—	—	—	—	—	155,246	-19	11,887	-86
Southern Natural Gas Co.*	7,679	138	48	7,865	47	13	60	256,737	1,262,702	42,408	1,180,923	-50
Southwest Gas Corp.	1,248	8	—	1,256	†5	—	†5	83,381	702,204	81,951	450,509	23,734
Southwest Gas Storage Co.	—	—	31	31	—	1	1	—	68,967	83	21,102	4,688
Southwest Gas Transmission Co.	—	8	—	8	—	—	—	—	1,539	32	356	82
Stingray Pipeline Co.*	353	—	—	353	2	—	2	—	245,135	1,402	37,670	6,706
Superior Offshore Pipeline Co.	112	—	—	112	—	—	—	—	13,078	4,592	625	-440
Tarpon Transmission Co.	40	—	—	40	—	—	—	—	21,089	42	3,743	2,517
TCP Gathering Co.	—	20	—	20	—	—	—	—	1,175	8	205	17
Tenneco Inc.*	14,050	31	2	14,083	65	1	66	473,264	3,518,583	106,323	2,113,648	-32,006
Texas Eastern Transmission Corp.*	9,837	48	200	10,085	77	8	85	721,921	2,823,025	318,388	2,141,766	4,393
Texas Gas Pipe Line Corp.	6	—	—	6	—	—	—	2,241	325	—	4,297	22
Texas Gas Transmission Corp.*	5,744	46	213	6,003	30	9	39	231,675	908,014	16,008	940,324	58,745
Texas Sea Rim Pipeline Inc.	29	—	—	29	—	—	—	—	15,478	252	583	-578
Trailblazer Pipeline Co.*	436	—	—	436	—	—	—	71,203	269,444	64	39,916	2,970
Transco Gas Supply Co.*	—	—	—	—	—	—	—	51,992	10	—	127,218	2,607
Transcontinental Gas Pipe Line Corp.*	10,302	149	121	10,572	40	29	69	365,116	3,146,163	27,197	1,959,794	49,725
Transwestern Pipeline Co.*	3,813	626	—	4,439	21	115	136	118,300	683,703	3,665	432,813	25,118
Trunkline Gas Co.*	4,020	497	27	4,544	21	14	35	204,227	1,002,745	13,280	954,746	34,931
Trunkline LNG Co.	—	—	—	—	—	—	—	—	578,906	-567	60,176	-122,249
U-T Offshore System*	30	—	—	30	—	—	—	244,894	63,030	-157	10,435	859
Union Gas System Inc.	389	16	9	414	2	4	6	10,995	30,722	1,840	40,122	-329
Union Light, Heat & Power Co.	—	—	—	—	—	—	—	10,297	65,884	6,993	183,342	7,183
United Gas Pipe Line Co.*	7,286	2,172	28	9,486	31	13	44	150,787	1,113,924	21,033	880,204	-37,950
Valero Interstate Trans. Co.	—	—	—	—	—	—	—	240	12,905	675	2,107	-699
Valley Gas Transmission Inc.		274	—	274	—	—	—	—	5,010	83	7,145	-357
Washington Gas Light Co.	363	—	—	363	—	—	—	107,573	738,903	48,763	689,520	39,345
West Texas Gas Inc.	—	—	—	—	—	—	—	800	19,205	500	20,635	-1,226
West Texas Gathering Co.	—	—	—	—	—	—	—	5,687	11,177	3	4,170	-1,091
Western Gas Interstate Co.	382	100	—	482	†5	—	†5	4,276	8,647	134	10,436	-1,833
Western Transmission Corp.	—	61	—	61	—	—	—	270	2,625	4	1,159	-534
Williams Natural Gas Co.*	5,835	3,757	176	9,768	29	34	63	239,679	633,534	29,256	666,827	24,279
Williston Basin Interstate Pipeline Co.*	3,082	879	159	4,120	22	10	32	33,789	202,533	7,390	147,392	6,149
Wyoming Interstate Co. Ltd.*	269	—	—	269	1	—	1	89,137	176,699	23	25,491	2,671
Zenith Natural Gas Co.	27	32	—	59	—	2	2	412	644	14	806	19
1986 Totals–majors (44)	**184,239**	**64,148**	**7,265**	**255,652**	**1,459**	**842**	**2,301**	**8,197,548**	**42,237,306**	**1,331,595**	**33,460,055**	**1,350,236**
1985 Totals–majors (44)	**180,490**	**67,587**	**4,333**	**252,410**	**1,537**	**654**	**2,191**	**11,043,723**	**41,894,279**	**1,912,648**	**47,582,348**	**1,796,937**
1986 Totals–all	**201,467**	**72,934**	**7,460**	**281,881**	**1,537**	**911**	**2,448**	**9,462,848**	**49,375,861**	**1,659,397**	**40,664,631**	**1,653,010**
1985 Totals–all	**197,727**	**77,145**	**4,523**	**279,395**	**1,629**	**726**	**2,355**	**12,533,273**	**48,321,080**	**2,240,578**	**56,252,921**	**2,190,807**

Source: FERC Forms 2's & 2A's for major and nonmajor natural-gas pipeline companies. Under criteria established for the 1984 reporting year (OGJ, Nov. 25, 1985, p. 80), major pipeline companies are those whose combined gas sold for resale and gas transported or stored for a fee exceeded 50 bcf at 14.73 psi (60° F.) in each of the 3 previous calendar years. Nonmajors are natural-gas pipeline companies not classified as majors and having had total gas sales of volume transactions exceeding 200 MMcf at 14.73 psi (60° F.) in each of the 3 previous calendar years. * Major natural-gas pipeline companies under FERC Accounting and Reporting Requirements for Natural Gas Companies, para. 20-011, effective Feb. 2, 1985, beginning with 1984 reporting year. † Type of compressor station not indicated by reporting company.

OGJ REPORT

Worldwide
Report

Exploration, like this seismic activity in Abu Dhabi, continues throughout the world despite the oil market setbacks of recent years. But revised estimates, rather than discoveries, account for most of a 27% increase in worldwide oil reserves. Photo courtesy of ADCO.

New data lift world oil reserves by 27%

Disclosures by members of the Organization of Petroleum Exporting Countries cast new light on long term petroleum supply.

To the degree the disclosures are valid, there's significantly more recoverable oil in the world than was believed at this time last year. Based on these reports, Oil & Gas Journal has increased its estimate of worldwide crude reserves as of Jan. 1, 1988, by 27% to 887.35 billion bbl. Among non-Communist countries, the estimate jumps by 31% to 808.15 billion bbl, of which OPEC now accounts for 82%.

Increases of this magnitude cannot be the result of new discoveries in a period of productive capacity surpluses, unstable crude oil prices, and depressed drilling. Instead, they reflect new estimates of the fruits of past exploratory efforts, based on revisions by the countries themselves or on information not previously available.

All the significant changes occur within OPEC. The group's 165 billion bbl reserves increase more than offsets a total decline elsewhere in the world. Several members of the organization, most of which revealed little about reserves before, this year announced figures significantly higher than previous estimates by themselves or others.

A possible explanation for their going public: belief that the exporters eventually may orient production quotas to individual members' reserves. However, such a step is unlikely in the present market environment.

Worldwide natural gas reserves total 3.8 quadrillion cu ft, compared with 3.6 quadrillion at the beginning of 1987.

OGJ estimates worldwide crude oil and lease condensate production this year averaged 55.7 million b/d, down 0.4% from 1986. The modest change masks major developments.

In 1986, production gained 4.4% as OPEC sacrificed price for market share, ignoring quotas much of the year. The production spree sent crude prices into their historic tailspin from $28/bbl at the end of 1985 to less than $10/bbl at times in 1986.

The organization reestablished quotas in the last quarter of 1986 and entered 1987 with production limited to 15.8 million b/d in a mostly successful effort to stabilize prices at $18/bbl. After the first quarter, however, OPEC flow increased as members violated quotas in renewed efforts to shore up national revenues. On balance, OPEC's average production finished the year down 2.5% from 1986.

Among leading non-OPEC producers, the U.S. had a 4.6% decline this year to an average of 8.27 million b/d. Also declining was the U.K., down 3% to 2.44 million b/d.

Production gainers include the Soviet Union 1.5% to 12.48 million b/d, Norway 16% to 973,000 b/d, Canada gained 2.5% to 1.5 million b/d, and Mexico 4.5% to 2.53 million b/d.

In a change, field-by-field production data this year reflect information as of yearend 1986 instead of the middle of the current year.

Worldwide refinery crude capacity increased to 72.93 million b/d from 72.26 million b/d in 1986. Non-Communist capacity increased to 55.32 million b/d from 54.65 million b/d in 1986.

These are the first worldwide and non-Communist refining capacity increases since 1981. In that year, capacities totaled 81.11 million b/d worldwide and 65.07 million b/d in non-Communist regions.

Reserves up. This year's reserves estimate surge reflects changes in six important countries, all members of OPEC, five of them adjoining the Persian Gulf.

Two are Iran and Iraq, which have been at war since 1981. Iraq reported significant discoveries recently despite the economic and labor drain of the war. Iran is not known to have added significantly to reserves through recent exploration.

Both countries this year reported reserves significantly greater than earlier estimates. Iraq's estimate is up 112% to 100 billion bbl. Iran reports a 90.3% increase to 92.85 billion bbl.

The United Arab Emirates also hiked reserves. Abu Dhabi reports reserves at 92.2 billion bbl, nearly triple prior estimates. Dubai's reserves jump to 4 billion bbl from 1.3 billion, Sharjah's to 1.5 billion from 500 million. In addition, reserves of Ras al Khaimah, not a key producer, doubled to 400 million bbl.

The other OPEC member with sharply higher reserves is Venezuela, traditionally more open with reserves information than most of the other exporters.

State owned Petroleos de Venezuela SA (Pdvsa) more than doubled its reserves estimate late in 1986, mainly to incorporate Orinoco heavy oil not previously counted. The change came too late to include in OGJ's 1986 report.

The current estimate is 56.3 billion bbl, of which Pdvsa attributes 26 billion bbl to the Orinoco region. The increase reflects an extensive field evaluation of the area during 1979-83.

The evaluation involved about 10,000 line-miles of seismic survey; 60,000 sq miles of gravity, magnetic, and aeromagnetic surveys; drilling of nearly 800 wells; and analysis of existing data from 15,700 line-miles of seismic survey.

The exploration covers an area in which fewer than 200 wells are estimated to have been drilled before 1976.

Venezuela increased its reserves estimate "pursuant to universally used geological concepts and definitions including those accepted by the Society of Petroleum Engineers and American Association of Petroleum Geologists," Pdvsa said at the time of the adjustment.

Production from the Orinoco region averaged 80,000 b/d at yearend 1986.

Venezuela rejects suggestions that OPEC politics had anything to do with its reappraisal of reserves. Pdvsa's main interest has been to secure markets for its production and to be viewed by the U.S. as a secure, nearby, long term supply of crude oil.

Discipline collapses. OPEC's collapse in quota discipline gained momentum through the last three quarters of 1987.

The 1986 quota agreement called for ceiling production of 15.8 million b/d during the first two quarters of 1987, 16.6 million b/d during the third quarter, and 18.3 million b/d in the fourth. In June the organization revised its fourth quarter allocation to 16.6 million b/d.

But apart from the first quarter of the year, when OPEC members produced an average of 15.7 million b/d, quotas have been exceeded. Second quarter production of 16.9 million b/d caused some disquiet and was partly responsible for a collective decision to reduce the final quarter's ceiling.

OPEC began to lose control in the third quarter, when output soared to 19 million b/d. In the first 2 months of the final quarter, output was slightly less than that. With inventories at high levels, OPEC faces new tests of its control when demand drops in the second quarter of 1988.

Quota discipline, always elusive, has been hampered by Iraq's insistence from the start that it be allowed to produce and sell as much oil as possible.

Iraq commissioned additional pipeline export capacity through Turkey and Saudi Arabia this year, which enabled production to rise from an average of 1.6 million b/d in the first quarter of the year, only 140,000 b/d above its nominal OPEC quota, to 2.3 million b/d in the third quarter, almost 1 million b/d more than the revised second half quota.

Iraq has demanded parity with Iran's 2.4 million b/d quota, while the Iranians are intent on maintaining current differentials.

Despite Iraqi air strikes on the tanker shuttle between Kharg Island and transshipment points in the lower gulf, Iranian output averaged 2.4 million b/d in the second quarter and 2.5 million b/d in the third. Embargoes on purchase of Iranian oil by France and the U.S. had greater effect.

Several other Middle Eastern OPEC members have consistently exceeded quotas. Output from the U.A.E. topped the 902,000 b/d first half quota by nearly 300,000 b/d. By the third quarter output reached 1.8 million b/d, more than 800,000 b/d above limit.

Less serious infringements came from Kuwait and Qatar during the fall production spurt. The only Middle East country that remained within sight of its OPEC quota is Saudi Arabia, which slightly exceeded the mark during the third quarter but returned later to its 4.343 million b/d limit.

During 1987 Oman made small production cuts to help its OPEC neighbors. At the end of the year North Yemen became a crude exporter for the first time. South Yemen plans to develop new fields that would enable exports to begin in 1989.

Better luck elsewhere. OPEC had better luck with quota discipline outside the Middle East.

North African OPEC producers remained close to their quotas throughout the year. Algeria, a vigorous supporter of production restraint, maintained output at 600,000-700,000

New production, such as that from Alwyn North field shown here, slowed but didn't halt declines from the U.K. North Sea in 1987.

b/d. Libya produced about 1 million b/d, marginally more than quota.

Nigerian production averaged about 1.2 million b/d during the first half of the year but jumped above quota to 1.4 million b/d during the third quarter surge. Still, production for the year was down 15.5%.

OPEC's other African member, Gabon, is a small producer so its quota excesses had little effect on the market. However, onshore discoveries by units of Royal Dutch/Shell Group and Ste. Nat. Elf Aquitaine have given Gabon the capacity to increase output in the early 1990s.

Outside OPEC, Egypt restrained production early in the year to support the organization's decision to support prices. Subsequently, however, Western Desert fields coming on stream pushed the year's production average up 10.6% to almost 900,000 b/d.

Another non-OPEC African production hike came in Angola, which added production in Cabinda and off the mainland.

In the Asia/Pacific region, OPEC member Indonesia had a production decline of 5.6% from 1986 to 1.18 million b/d. The country has been opening new acreage for exploration.

Australia's production increased 10.3% in 1986 to 566,000 b/d, a trend likely to continue as recently announced marginal field developments in the Bass Strait and frontier discoveries in the Timor Sea come on stream.

Brunei's production declined in 1987, as did that of other important regional producers Malaysia and India. Among new production due in the region is first oil from the Gulf of Thailand, due on stream early in 1988 at a rate of 10,000 b/d.

No help from Britain. Britain continued to reject OPEC calls for reduced North Sea output.

But its North Sea flow is slipping, now averaging 2.45 million b/d. Total North Sea flow averaged 3.6 million b/d this year.

Three oil fields started production in the U.K. sector during 1987: Clyde, averaging 43,000 b/d; the Ness subsea satellite to Beryl field, averaging 17,000 b/d; and Alwyn North, climbing toward 95,000 b/d.

Two other small fields, Petronella and Balmoral, started production toward the end of 1986 and made their first significant contributions to U.K. output during 1987. The new production isn't sufficient to reverse the U.K. sector's slow decline, stemming from maturation of the biggest fields.

OPEC's call for production restraint did not go unheeded in Norway. After diverting royalty crude from the market into strategic storage at the end of 1986, Norway extended its policy with an 80,000 b/d across the board production cut that remained in force through 1987.

The policy was not welcomed by offshore operators and caused difficulties for the Norwegian partners of Statfjord field, which extends across the median line into British waters.

Norwegian output increased by 16%, nevertheless, recently exceeding 1 million b/d due to new production. It will continue climbing in 1988 as output from Gullfaks field rises. Also boosting Norwegian flow during 1987 was Ula field, which went on stream at the end of 1986 and currently produces nearly 100,000 b/d.

The Norwegian government wants to avoid another production jump, which it fears would overheat the economy, in the early 1990s. It's considering limiting the number of fields that can be developed at any one time. A waiting list for seven development prospects has been drawn up and is likely to be implemented in 1988.

Among the small North Sea producers, Denmark hit the 100,000 b/d output mark for the first time this year. New production capacity in Dan field boosted flow by 27% to an average of 94,000 b/d. In the Netherlands, production increased by 2.5% to 91,300 b/d.

Western Hemisphere slumps. The U.S. production drop helped pull down Western Hemisphere output by 2.4% from 1986.

Alaskan North Slope flow remains at about 2 million b/d with the help of first flow from Endicott field. But U.S. output elsewhere continues to fall. Lower 48 production in October was 1 million b/d less than recent peak levels of early 1986.

The Western Hemisphere's two OPEC members, Ecuador and Venezuela, had production declines this year.

Venezuela generally stayed within quota. Ecuador's flow dropped 45% because of a Mar. 5 earthquake that destroyed a section of the trans-Ecuadorean crude oil pipeline, halting production until Aug. 14.

Peru also had a production decline, in part due to foreign exchange problems and bureaucratic delays in its partly nationalized oil industry.

Colombia had the biggest percentage gain in the Western Hemisphere, 29% to 387,000 b/d, as production increased from giant Cano Limon field and satellites. Those gains will continue.

Although Argentina and Brazil, two important Western Hemisphere producers, had declines in 1987, new production is on stream or soon will be.

Argentina's Hidra field off Tierra del Fuego will start production early in 1989, rising to 27,000 b/d.

And Brazil started up giant Albacora field off Rio de Janeiro state late in the year, eyeing peak production of 18,000 b/d from the first phase of development.

State owned Petroleo Brasileiro SA continues to make significant discoveries in the upper Amazon onshore region and deepwater Campos basin, but national economic problems may slow development. ■

	ESTIMATED PROVED RESERVES 1-1-1988		OIL PRODUCTION			REFINING Capacity (b/cd) January 1, 1988				
COUNTRY	Oil (1,000 bbl)	Gas (10^9 cu ft)	Producing wells* Dec 31, 86	Estimated 1987 (1,000 b/d)	% change from 1986	No. of ref.	Crude	Thermal operations	Catalytic cracking	Catalytic reforming
ASIA-PACIFIC										
Australia	1,691,960	18,610	869	566.1	+10.3	10	637,100	...	184,800	154,800
Bangladesh	500	12,720	10	0.5	...	1	31,200	...	...	1,650
Brunei	1,420,000	7,010	609	133.7	− 8.5	1	10,000	...	...	...
Burma	58,000	9,460	450	24.0	−20.0	2	26,300	1,700	...	...
China, Taiwan	5,400	890	90	2.6	+35.7	2	600,000	15,000	25,000	62,500
India	4,250,000	17,550	2,670	608.7	− 2.8	12	1,058,742	113,900	133,470	26,690
Indonesia	8,400,000	73,000	5,774	1,185.8	− 5.6	6	714,200	92,500	12,600	62,100
Japan	56,790	1,030	387	12.1	− 2.2	43	4,566,850	82,800	557,150	533,940
Korea, South	...	...	...	...	...	5	820,000	30,000	...	59,450
Malaysia	2,900,000	52,200	452	467.4	− 4.4	4	212,300	...	...	21,410
New Zealand	160,000	5,200	38	28.3	− 4.2	1	81,700	...	...	21,700
Pakistan	96,000	22,400	44	41.6	+ 1.4	3	130,050	...	...	5,450
Papua New Guinea	200,000	1,000	...	...	...	...	...	...	...	...
Philippines	16,000	10	10	5.1	−25.6	4	286,000	...	23,100	40,200
Singapore	...	...	...	...	...	5	858,000	137,700	....	54,300
Sri Lanka	...	...	...	...	...	1	50,000	12,500	...	3,750
Thailand	99,000	3,720	167	31.3	− 9.7	3	191,860	9,600	9,250	25,300
Total Asia-Pacific	**19,353,650**	**224,800**	**11,570**	**3,107.2**	**− 2.5**	**103**	**10,274,302**	**495,700**	**945,370**	**1,073,240**
WESTERN EUROPE										
Austria	105,000	420	1,177	21.6	+ 2.8	1	204,000	17,000	24,000	32,000
Belgium	...	...	...	...	...	4	630,500	62,800	102,000	80,300
Cyprus	...	...	...	...	...	1	16,000	...	...	3,400
Denmark	440,000	4,400	40	94.0	+27.2	3	177,000	70,670	...	31,100
Finland	...	...	...	...	...	2	241,000	46,300	41,800	42,900
France	212,620	1,170	583	63.5	+ 7.2	14	1,940,600	163,550	288,800	258,700
Germany, Fed. Rep.	316,000	6,400	3,129	73.8	− 6.8	16	1,647,800	286,400	174,700	307,100
Greece	21,600	20	16	24.4	− 7.9	4	384,500	41,120	50,500	51,300
Ireland	...	1,900	...	...	...	1	56,000	...	...	11,000
Italy-Sicily	739,000	10,200	239	50.0	+ 2.0	19	2,563,100	388,400	277,400	289,600
Netherlands	195,000	64,100	550	91.3	+ 2.5	7	1,381,000	151,560	125,500	157,400
Norway	14,800,000	105,940	202	973.3	+16.0	3	240,000	85,500	...	29,150
Portugal	...	...	...	...	...	3	294,300	...	10,100	35,400
Spain	38,600	600	48	32.8	−13.1	10	1,305,000	178,000	143,500	189,100
Sweden	...	...	...	...	...	5	436,500	68,000	27,000	72,700
Switzerland	...	...	...	...	...	2	132,000	20,000	...	26,000
Turkey	380,000	1,030	564	52.0	+ 3.9	5	675,595	4,500	34,100	65,370
United Kingdom	5,200,000	22,000	710	2,445.9	− 3.0	15	1,802,700	152,000	392,000	367,500
Total Western Europe	**22,447,820**	**218,180**	**7,258**	**3,922.6**	**+ 2.0**	**115**	**14,127,595**	**1,735,800**	**1,691,400**	**2,050,020**
MIDDLE EAST										
Abu Dhabi	92,205,000	183,500	517	969.4	+ 3.0	2	180,000	...	...	30,055
Bahrain	140,550	6,900	279	43.2	+9.1	1	250,000	19,000	36,000	17,100
Dubai	4,000,000	6,000	150	381.2	+14.0	...	...	...	...	...
Iran	92,850,000	489,400	361	2,341.7	+26.7	4	530,000	80,800	...	63,845
Iraq	100,000,000	26,300	615	2,095.8	+24.0	7	318,500	...	...	43,500
Israel	700	30	9	1.0	...	2	180,000	70,000	20,000	26,000
Jordan	12,000	...	10	4.0	...	1	100,000	....	4,410	8,640
Kuwait	91,920,000	36,400	363	1,095.8	−11.9	4	628,000	...	30,000	51,000
Lebanon	...	...	...	...	...	2	37,000	...	7,250	7,492
Neutral Zone	5,210,000	12,300	491	399.2	+16.4	...	...	...	...	...
Oman	4,012,000	9,500	789	565.0	+ 1.2	1	76,932	...	...	15,386
Qatar	3,150,000	156,700	174	284.4	−14.6	1	62,000	...	...	12,030
Ras al Khaimah	400,000	2,000	6	10.0	+ 9.0	...	...	...	...	...
Saudi Arabia	166,980,000	139,900	588	4,054.2	−16.8	7	1,375,000	27,000	76,000	178,900
Sharjah	1,500,000	12,000	20	66.9	+ 9.4	...	...	...	...	...
Syria	1,750,000	1,500	963	231.7	+19.4	2	228,790	41,199	...	19,348
Yemen, North	550,000	1,600	45	10.0	...	1	10,000	...	...	2,500
Yemen, South	...	...	...	...	...	1	170,000	...	...	12,000
Total Middle East	**564,680,250**	**1,084,030**	**5,380**	**12,553.5**	**+ 0.5**	**36**	**4,146,222**	**237,999**	**173,660**	**487,796**

EDITOR'S NOTE: All reserves figures except those for the U.S.S.R. (and gas for Canada) are reported as proved reserves recoverable with present technology and prices. U.S.S.R. figures are "explored reserves" which include proved, probable, and some possible. Canadian gas figure, under criteria adopted by Canadian Petroleum Association in 1980, includes proved and some probable. *Does not include shut in, injection, or service wells. †Estimates based on capacity as of Jan. 1, 1987, plus known 1987 closures and expansions. §Includes Albania, Bulgaria, Cuba, Czechoslovakia, East Germany, Hungary, Mongolia, North Korea, Poland, Romania, Viet Nam, and Yugoslavia.

	ESTIMATED PROVED RESERVES 1-1-1988		OIL PRODUCTION			REFINING Capacity (b/cd) January 1, 1988				
COUNTRY	Oil (1,000 bbl)	Gas (10^9 cu ft)	Producing wells* Dec 31, 86	Estimated 1987 (1,000 b/d)	% change from 1986	No. of ref.	Crude	Thermal operations	Catalytic cracking	Catalytic reforming
AFRICA										
Algeria	8,500,000	105,900	840	647.9	+ 4.0	4	464,700	...	...	55,600
Angola-Cabinda	1,149,000	1,760	381	341.3	+21.0	1	32,100	...	...	1,900
Benin	100,000	...	6	12.0	+55.8	...	...	...	...	...
Cameroon	520,000	3,880	176	170.0	− 5.6	1	43,000	...	...	6,500
Congo	720,000	2,470	286	118.0	+ 2.6	1	21,000	...	...	2,000
Cote d'Ivoire	...	...	...	...	...	2	60,000	...	...	16,600
Egypt	4,300,000	10,240	724	899.3	+10.6	7	452,110	16,470	...	30,940
Ethiopia	...	...	...	...	...	1	18,000	...	...	2,200
Gabon	645,000	600	295	155.8	− 3.2	1	23,000	7,200	...	1,500
Ghana	1,000	...	...	...	...	1	28,000	...	...	5,550
Ivory Coast	120,000	3,530	14	16.0	− 7.9	...	...	...	...	...
Kenya	...	...	...	...	...	1	90,000	...	...	9,000
Liberia	...	...	...	...	...	1	15,000	...	...	2,000
Libya	21,000,000	25,700	661	1,019.7	− 1.1	2	329,400	...	...	14,582
Madagascar	...	...	...	...	...	1	16,350	...	...	2,600
Morocco	2,700	70	4	0.3	− 5.0	2	154,600	...	5,600	26,800
Mozambique	...	2,200	...	...	...	...	...	...	...	...
Nigeria	15,980,000	84,000	1,253	1,238.6	−15.5	3	270,000	...	47,000	39,700
Senegal	...	...	...	...	...	1	29,800	...	...	2,870
Sierra Leone	...	...	...	...	...	1	10,000	...	...	...
Somalia	...	210	...	...	...	1	10,000	...	...	...
South Africa	...	980	...	...	...	4	433,500	63,500	84,400	62,800
Sudan	300,000	...	...	...	...	1	21,440	...	...	1,700
Tanzania	...	4,100	...	...	...	1	13,500	...	...	3,000
Togo	...	...	...	...	...	1	20,000	...	...	4,400
Tunisia	1,800,000	2,960	150	104.3	− 2.9	1	34,000	...	...	3,300
Zaire	112,000	30	104	31.8	− 2.0	1	17,000	...	...	3,000
Zambia	...	...	...	...	...	1	23,750	...	5,040	5,040
Total Africa	**55,249,700**	**248,630**	**4,894**	**4,755.0**	**− 1.7**	**42**	**2,630,250**	**87,170**	**142,040**	**303,582**
WESTERN HEMISPHERE										
Argentina	2,270,000	23,600	8,389	419.1	− 1.1	11	689,500	120,800	112,450	39,600
Barbados	3,620	10	75	1.4	− 9.1	1	3,000	...	...	...
Bolivia	156,000	5,040	296	18.5	+ 5.3	3	46,930	...	...	14,158
Brazil	2,340,000	3,600	4,880	562.8	− 1.9	13	1,407,300	33,800	350,500	24,800
Canada	6,825,000	98,000	35,246	1,508.3	+ 2.5	27	1,868,900	78,150	385,550	368,650
Chile	290,000	4,200	347	28.3	−15.3	2	141,000	18,400	37,000	5,300
Colombia	1,590,000	3,600	2,770	387.8	+29.1	4	226,000	60,000	91,000	6,000
Costa Rica	...	...	...	...	...	1	16,200	6,500	...	1,200
Dominican Republic	...	...	...	...	...	2	48,500	...	...	7,900
Ecuador	1,615,000	4,020	922	157.2	−45.2	3	122,000	25,200	16,000	2,780
El Salvador	...	...	...	...	...	1	17,000	...	...	3,800
Guatemala	41,500	20	12	3.9	−20.6	1	16,000	...	...	3,000
Honduras	...	...	...	...	...	1	14,000	...	...	1,800
Jamaica	...	...	...	...	...	1	35,500	...	...	3,540
Martinique	...	...	...	...	...	1	12,800	...	...	7,410
Mexico	48,610,000	76,530	3,768	2,537.8	+ 4.5	9	1,354,000	82,000	267,000	157,800
Netherlands Antilles	...	...	...	...	...	2	320,000	67,000	42,000	15,000
Nicaragua	...	...	...	...	...	1	14,500	...	...	2,800
Panama	...	...	...	...	...	1	100,000	...	...	7,500
Paraguay	...	...	...	...	...	1	7,500	...	...	...
Peru	511,860	650	3,438	166.7	− 7.1	6	182,018	...	21,305	1,680
Puerto Rico	...	...	...	...	...	2	123,000	....	12,000	5,800
Suriname	27,000	...	56	2.2	+13.4	...	...	...	...	...
Trinidad & Tobago	567,000	10,390	3,211	163.1	− 3.4	2	300,000	18,000	25,000	31,000
Uruguay	...	...	...	...	...	1	45,000	...	5,000	3,000
Venezuela	56,300,000	95,000	9,797	1,591.9	− 3.2	6	1,201,100	138,000	193,100	6,000
Virgin Islands	...	...	...	...	...	1	545,000	80,000	...	125,000
United States	25,270,000	186,700	636,475	8,276.7	− 4.6	†187	†15,288,274	†1,789,088	†5,014,195	†3,595.532
Total Western Hemisphere	**146,416,980**	**511,360**	**709,682**	**15,825.7**	**− 2.4**	**291**	**24,145,022**	**2,516,938**	**6,572,100**	**4,441,050**
Total non-Communist	**808,148,400**	**2,287,000**	**738,784**	**40,164.0**	**− 1.0**	**587**	**55,323,391**	**5,073,607**	**9,524,570**	**8,355,688**
COMMUNIST AREAS										
China	18,400,000	30,700	34,000	2,647.0	+ 1.0	40	2,200,000	NA	NA	NA
U.S.S.R.	59,000,000	1,450,000	128,000	12,486.5	+ 1.5	39	12,260,000	NA	NA	NA
Other§	1,800,000	29,300	NA	422.0	− 1.2	45	3,150,000	NA	NA	NA
Total Communist	**79,200,000**	**1,510,000**	**162,000**	**15,555.5**	**+ 1.4**	**124**	**17,610,000**	**NA**	**NA**	**NA**
TOTAL WORLD	**887,348,400**	**3,797,000**	**900,784**	**55,719.5**	**− 0.4**	**711**	**72,933,391**	**5,073,607**	**9,524,570**	**8,355,688**

Worldwide Production

• Offshore (e) Estimated (c) Condensate (NA) Not available

WORLDWIDE PRODUCTION

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
ABU DHABI(e)	DEPARTMENT OF PETROLEUM	• Arzanah, 1973	11,000-11,300	517	862	941,590	8,035,410,900	42.0
		• Abu Al Bukhoosh, 1969	8,900-10,900					32.0
		• Mubarras, 1969	8,300-10,000					37.0
		• El Bunduq, 1964	9,400-10,900					40.0
		Asab, 1965	8,000- 8,700					41.0
		Bab, 1958	8,600- 9,300					44.0
		Bu-Hasa, 1962	8,300- 9,200					39.0
		Sahil, 1967	9,500- 9,800					41.0
		• Umm Shaif, 1958	9,800-12,000					37.0
		• Zakum, 1963	9,600-12,000					39.0
		• Umm al-Dalkh, 1969	7,700-8,500					...
		Total Abu Dhabi		**517**	**862**	**941,590**	**8,035,410,900**	
ALGERIA(e)	SONATRACH	Zarzaitine, 1957	4,700	840	840	623,000	7,300,895,000	42.2
		Edjeleh, 1956	1,500- 2,800					37.2
		Tiguentourine, 1966	2,160- 4,265					44.4
		El Adeb Lareche, 1958	4,100					43.3
		Assakaifaf N. & S., 1958	2,800					42.7
		Tan Emellel N. & S., 1960	2,800- 4,500					42.5
		Edeyen, 1964	5,580					41.5
		Hassi Mazoula S., 1963	4,430					40.2
		Hassi Mazoula B., 1965	4,920					42.0
		Acheb W. & Kreb, 1963 & 1960	7,360					45.6
		Tin Fouye N. +F6, 1962	4,265					39.6
		El Borma, 1967	8,200					42.9
		Keskassa, 1968	8,860					42.9
		Mereksen, 1974	9,420					45.8
		Gara, 1962	9,420					42.9
		Hassi Messaoud N., 1956	10,500					45.9
		Hassi Messaoud S., 1956	10,500					46.1
		Gassi-Touil & Gassi-Touil E., 1961	6,890					50.6-50.8
		Hassi Chergui	8,200					50.6
		Nezla N., 1965	8,530					51.5
		Rhourde El Baguel, 1962	9,850					40.2
		Mesdar E. & W., 1972	11,155					40.3
		El Gassi-El Agreb, 1959	10,170					47.9
		Rhourde Nouss & E., 1972	8,530					39.7
		Tin Foye Tabankort, 1966	4,600- 6,560					41.1-41.3
		Djoua W., 1967	5,580- 6,240					41.1
		Amassak, 1970	6,565					41.1
		Tamendjelt, 1970	5,585- 6,890					41.1
		Timedratine, 1964	8,155					42.7
		Ohanet N. & S., 1960	7,878					43.8
		Askarene, 1962	8,200					41.7
		Guelta, 1962	8,960					41.7
		Stah, 1971	9,515					45.8
		Ras Toumb, 1976	9,190					35.7
		Haoud Berkaoui-Ben Kahla, 1965	11,000					43.6
		Guellala-Guellala N.E., 1969	11,320					42.2-42.3
		N'Goussa, 1974	11,715					42.2
		Kef El Argoub, 1973	12,570					42.2
		Oued Noumer, 1969	8,860					48.3
		Djorf, 1974	9,025					48.3
		Djebel Onk, 1960	3,940					37.0
		Alrar FJT	...					...
		Hassi R'Mel(c)	...					...
		Gassi Touil(c)	...					...
		Other Crude	...					...
		Condensate	...					...
		Total Algeria		**840**	**840**	**623,000**	**7,300,895,000**	
ANGOLA	FINA ANGOLA	Benfica, 1955	8,300	1	11	15	2,266,000	30.0
		Cacuaco, 1958	7,870	2	8	17	245,000	30.0
		Galinda, 1959	7,220	...	8	...	2,245,000	30.0
		Tobias, 1961	1,970	1	8	56	28,794,000	31.0
		Mulenvos, 1966	5,900- 6,600	7	12	230	4,957,000	25.0
		Quenguela, 1968	6,000	30	58	2,375	36,146,000	31.0
		Legua, 1972	6,300	1	2	95	624,000	31.0
		Bento, 1972	7,350	1	3	295	4,797,000	26.0

		Name of field, discovery date	Depth, ft	No. of wells		Production		°API gravity
				Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	
		C. Cobra, 1969	4,000	11	13	660	2,622,000	41.0
		Quinguila, 1972	3,400	18	31	8,050	30,158,000	36.0
		N'Zombo, 1973	5,000- 6,300	24	29	12,835	83,400,000	33.0
		Quinfuquena, 1975	6,800- 7,100	13	15	5,030	22,563,000	32.0
		Ganda, 1975	5,000	3	3	2,460	4,729,000	36.0
		Sereia, 1974	6,200	2	3	205	851,000	27.0
		Lumueno, 1977	4,600	8	11	2,260	2,657,000	37.0
		Pambo, 1982	4,600	4	4	815	1,420,000	39.0
		Luango, 1977	3,800	3	3	775	1,697,000	38.0
	CHEVRON	• Malongo North, 1966	1,170- 9,250	63	74	14,066	205,468,645	30.0
		• Malongo West, 1967	1,680- 8,800	22	37	16,904	223,720,583	22.5
		• Malongo South, 1966	1,150- 1,440	29	33	8,542	69,129,227	25.0
		• Kali, 1969	11,400-11,660	1	1	403	4,117,231	30.0
		• Kungulo, 1975	4,000	16	17	12,477	39,338,146	32.2
		• Limba, 1969	2,660- 7,350	10	14	11,427	81,176,855	31.6
		• Kambala, 1971	10,500	5	5	7,564	15,220,236	32.8
		• Livuite, 1979	8,000	5	7	723	2,313,862	31.7
		• Takula, 1971	3,070- 9,090	68	71	107,260	111,037,798	31.5
		• Lifuma, 1984	7,800	...	1	512	187,404	31.4
		• Vuko, 1983	3,700	5	6	10,071	3,750,149	35.0
		• Wamba, 1982	2,700	7	7	137	50,000	29.0
	TEXACO	• Cuntala, 1978	7,200	1	3	169	2,152,306	31.0
		• Essungo, 1975	6,500	10	16	5,897	17,642,319	35.0
	ELF ANGOLA(a)	• Palanca, 1981	8,860	8	8	37,700	22,834,700	40.0
		• Pacassa, 1982	11,500	2	2	12,005	2,948,400	38.0
		Total Angola		**381**	**524**	**282,030**	**1,031,258,861**	
ARGENTINA	**YPF**	Chubut 1907	1,908- 9,168	2,171	2,220	85,776	967,339,718	21.1-26.0
		Jujuy, 1969	2,461-16,732	9	10	1,283	60,548,706	46.5-47.0
		La Pampa, 1968	3,609- 4,921	180	185	8,069	71,804,456	31.0
		Mendoza, 1932	2,178-16,778	1,087	1,113	94,769	1,037,956,207	23.7-32.0
		Neuquen, 1918	1,312-12,498	986	1,049	62,431	460,737,391	24.0-41.0
		Rio Negro, 1960	2,953- 7,546	794	853	41,130	425,218,630	22.5-41.0
		Salta, 1928	6,551-15,092	41	60	12,830	116,198,809	29.0-59.0
		Santa Cruz, 1946	1,468-17,060	2,935	3,014	95,662	950,013,139	21.1-30.0
		Tierra del Fuego, 1959	5,249- 7,824	182	196	18,439	146,176,000	43.4-46.0
		Formosa, 1984	11,466-11,490	4	5	3,434	3,440,901	42.0-42.9
		Total Argentina		**8,389**	**8,705**	**423,823**	**4,239,434,157**	
AUSTRALIA	**BARRACK ENERGY**	Mount Horner, 1965	3,800- 5,800	1	4	11	10,652	38.0
	BHP PETROLEUM PTY. LTD.	• Jabiru, 1983	4,786	1	1	14,120	2,005,022	42.3
		Riverslea, 1981	4,504	2	3	163	254,364	25.2
		Yapunyah, 1982	4,311	1	1	4	17,268	39.2
	BOND CORP., PETROLEUM DIVISION	• Harriet, 1983	6,230	7	7	7,900	2,739,500	38.2
	BRIDGE OIL LTD.	Thomby Creek, 1979	5,180	...	4	...	52,833	5[illegible].0
		Yellow Bank Creek, 1982	5,064	2	3	124	315,300	52.0
		Louise, 1986	5,900	1	2	146	27,100	59.0
		Narrows, 1986	5,740	1	1	10	970	59.0
	CSR OIL & GAS DIV. BRISBANE	Anabranch, 1965	4,188	1	1	10	12,132	44.0
		Duarran, 1964	4,105	...	1	...	14,036	37.0
		Maffra, 1965	4,251	2	1	16	21,614	48.0
		Richmond, 1963	3,643	1	1	6	15,355	43.0
		Snake Creek, 1964	4,990	1	1	22	10,881	67.0
		Sunny Bank, 1962	6,139	...	1	...	706	40.0
		Trinidad, 1965	4,599	1	2	1	62,341	46.0
	DELHI PETROLEUM	Jackson, 1981	4,750	29	29	14,890	14,170,000	40.0-48.0
		Jackson South, 1982	4,800	6	6	1,555	1,503,000	40.8
		Chookoo, 1985	6,000	2	3	315	139,000	45.0
		Wilson, 1983	5,000	6	6	461	366,000	40.0
		Naccowlah South, 1983	6,000	6	6	2,084	1,744,000	40.0-46.0
		Gunna, 1983	6,000	1	1	52	58,000	40.0
		Tinpilla, 1983	6,000	1	1	39	53,000	40.0
		Naccowlah West, 1983	5,700	6	6	1,472	1,122,000	40.0
		Bogala, 1984	6,900	1	1	185	188,000	40.0
		Yanda, 1984	8,000	1	2	40	24,000	40.0
		Mooliampah, 1985	6,000	1	1	87	42,000	40.0
		Watson South, 1985	5,500	1	2	507	257,000	40.0
		Sigma, 1983	5,700	1	1	84	36,000	40.0
		Tickalara, 1984	5,600	1	2	115	69,000	40.0
		Big Lake, 1984	6,600	4	4	274	198,000	45.0-48.0
		Gidgealpa, 1984	6,150	11	11	2,167	1,386,000	45.0-50.0
		McKinlay, 1985	5,100	1	2	38	18,000	41.0
		Strzelecki, 1978	5,800	17	17	6,699	9,675,000	43.0-49.0
		Dullingari, 1979	5,200	1	2	3,797	5,228,000	45.0

			No. of wells		Production		
	Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
	Narcoonowie, 1983	6,000	1	2	118	79,000	52.0-53.0
	Limestone Creek/Biala, 1984	5,100	4	5	1,387	608,000	41.0
	Wancoocha, 1984	6,000	4	5	1,118	768,000	44.0-54.0
	Muteroo, 1985	6,000	3	3	2,063	957,000	45.0
	Spencer, 1986	6,500	2	2	463	169,000	47.0
	Jena, 1985	5,200	1	1	82	32,000	41.0
	Alwyn, 1985	5,200	1	1	133	42,000	41.0
	Dirkala, 1986	7,[illegible]0	1	2	780	222,000	56.0
	Nungaroo, 1985	4,[illegible]50	1	1	130	19,000	40.0
	Ulandi, 1985	5,200	1	1	82	43,000	40.4
	Watson, 1985	...	2	2	28	10,000	...
	Cooroo/Cooroo North, 1986	...	3	3	NA	3,000	...
	Challum, 1983	...	1	1	9	8,000	...
	Kerinna, 1984	4,300	1	1	80	7,000	41.0
	Kercummura, 1985	...	...	1	...	1,000	50.8
	Cook, 1985	...	...	...	18	15,000	...
ESSO-BHP[e]	• Barracouta, 1965	4,550	2	2	403,281	2,260,364,560	62.8
	• Marlin, 1966	5,100	1	4			50.0
	• Kingfish, 1967	7,500	26	37			46.9
	• Halibut, 1967	7,700	10	17			43.3
	• Mackerel, 1969	7,700	18	18			45.6
	• Tuna, 1968	6,500	20	22			40.5
	• Snapper, 1968	4,350	16	21			47.0
	• Cobia, 1972	7,700	10	12			44.6
	• West Kingfish, 1968	7,500	15	18			46.9
	• Fortescue, 1978	7,700	23	25			43.0
	• Flounder, 1968	8,200	8	10			46.7
HARTOGEN GROUP	Kooroopa, 1985	3,300	1	1	20	10,783	42.0
	Talgeberry, 1985	3,900	3	3	167	87,889	46.0
	Washpool, 1985	5,250	...	1	...	...	35.0
	Toobunyah, 1985	3,500	4	4	235	89,157	43.0
	Takyah, 1985	3,800	2	2	12	4,605	43.0
	Ipundu, 1986	2,700	1	1	44	15,900	43.0
	Borah Creek, 1982	4,900	...	2	...	8,265	34.0
	Kincora, 1980	4,700	4	4	53	284,214	34.0
	Sandy Creek, 1982	4,900	1	1	4	7,068	34.0
	Waratah, 1982	5,350	4	5	127	236,018	34.0
	Tintaburra, 1984	3,500	6	6	381	261,098	43.0
HOME ENERGY	Blina, 1981	4,300	6	6	797	899,608	37.0
	Sundown, 1983	3,600	2	4	150	141,990	39.0
	West Terrace, 1985	3,800	1	1	136	85,619	33.0
LASMO	Bodalla South, 1984	4,800- 5,230	6	6	2,776	1,873,236	47.2-48.7
	Kenmore, 1985	4,600- 4,980	8	8	2,447	1,001,209	48.2-45.8
	Black Stump, 1986	5,360	1	1	198	72,351	45.2
	Glenvale, 1985	3,800	1	1	11	4,353	49.3
TMOC RESOURCES LTD.	Moonie, 1961	5,800	27	36	656	21,439,311	44.5
	Alton, 1964	6,000	6	9	28	1,880,463	49.5
	Bennett, 1965	5,960	1	2	5	114,025	45.0
	Cabawin, 1961	10,800	1	1	10	57,827	49.0
	Mereenie, 1964	4,000	24	36	3,412	2,267,318	48.9
PANCONTINENTAL PETROLEUM LTD.	Nockatunga, 1983	5,420	4	5	294	155,931	49.6
	Winna, 1985	4,526	1	1	130	51,678	46.3
	Koora, 1985	4,822	1	2	2	944	41.7
	Thungo, 1986	4,670	1	1	1	21,399	45.7
	Kihee, 1986	3,200	1	1	59	212	44.7
SANTOS LTD.	Tirrawarra, 1970	9,500	29	35	4,550	5,944,000	52.0
	Moorari, 1971	7,705- 9,400	5	6	578	939,000	46.9
	Fly Lake, 1971	9,300	3	3	237	435,000	53.0
	Brolga, 1983	9,547	1	1	82	31,000	53.0
	Woolkina, 1982	9,700	1	1	103	89,000	51.5
	Merrimelia, 1964	5,250- 7,070	10	11	1,307	2,073,224	35.5
	Meranji, 1985	5,660	2	2	426	186,000	41.0
	Bookabourdie, 1984	7,000	1	1	66	17,000	46.0
STRATA OIL	Woodada,[c] 1980	7,400	...	..	...	24,862	54.0
WAPET GROUP	Barrow Island, 1964	1,200- 6,700	394	504	19,178	218,193,074	37.0
	Dongara, 1969	5,250- 5,577	4	8	126	886,950	35.5
WOODSIDE	North Rankin,[c] 1972	9,800	7	8	7,402	4,965,395	52.3
	Total Australia		**869**	**1,084**	**513,367**	**2,570,040,610**	

AUSTRIA

	Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
MOBIL	Voitsdorf, 1963	7,000	26	38	586	21,423,279	36.0
	Sattledt, 1971	5,700	13	18	621	4,861,898	37.0
	Kemating, 1979	6,100	8	9	956	3,332,235	34.0
	Gaiselberg, 1938	5,200	34	69	792	31,842,068	26.0
	Other	...	71	109	2,230	25,515,908	33.0

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
	OEMV[e]	Hochleiten, 1977	3,100- 5,000	1,025	1,025	15,817	565,558,168	21.3
		Matzen, 1949	6,100					25.7
		Pirawarth, 1957	1,600- 6,500					28.4
		St. Ulrich, 1938	1,600- 4,300					31.1
		Other	...					...
		Total Austria		**1,177**	**1,268**	**21,002**	**652,533,556**	
BAHRAIN	BANOCO	Awali, 1932	1,850- 4,600	279	351	39,580	770,722,000	33.0
		Total Bahrain		**279**	**351**	**39,580**	**770,722,000**	
BARBADOS	BARB. NOC	Woodbourne, 1966	1,665- 6,701	75	135	1,532	4,093,539	29.0
		Total Barbados		**75**	**135**	**1,532**	**4,093,539**	
BENIN(e)	PAN OCEAN	Seme, 1968	6,232	6	6	7,700	9,594,780	22.6
		Total Benin		**6**	**6**	**7,700**	**9,594,780**	
BOLIVIA	YPFB[e]	Camiri, 1927	3,936	45	45	12,405	269,810,296	55.0
		Carand, 1960	3,940	33	33			60.0
		Colpa, 1961	9,184	15	15			65.0
		Monteagudo, 1966	4,592	25	25			41.0
		La Pena, 1965	8,856	17	17			43.0
		Palmar, 1964	10,758	6	6			65.0
		Rio Grande, 1961	9,512	37	37			62.0
		Vuelta Grande, 1978	8,220	6	6			67.0
		Espino, 1979	14,655	1	1			56.2
		San Rogue, 1981	7,170	5	5			71.0
		Santa Cruz, 1986	9,350	5	5			65.0
		Other	...	79	79			...
	OCCIDENTAL	Tita, 1976	6,450	10	15	266	4,025,438	67.9
		Porvenir, 1978	9,600	6	9	3,597	9,292,999	60.5
	TESORO BOLIVIA PETROLEUM CO.	La Vertiente, 1977	15,230	6	7	1,298	3,683,076	64.1
		Escondido, 1980	11,293	...	3	...	...	60.0
		Taiguati, 1981	10,174	...	1	...	...	63.0
		Los Suris, 1981	13,577	...	1	...	...	50.0
		Total Bolivia		**296**	**310**	**17,566**	**286,811,809**	
BRAZIL	ALAGOAS	Furado, 1969	4,440- 5,500	49	58	2,260	12,950,700	35.0
		Pilar, 1981	4,100- 5,100	46	72	8,130	7,208,110	40.0
		Tabuleiro de Martins, 1957	3,900- 4,950	20	28	600	3,677,000	27.0
		• Mero, 1974	6,500- 7,400	...	...	...	150,950	35.0
		Other	...	15	22	340	1,641,640	...
	AMAZONAS	Igarapé Cuia, 1985	3,600- 3,700	...	...	101	20,751	41.0
		Rio Urucú, 1986	7,500- 8,300	...	...	...	...	44.0
	BAHIA	Agua Grande, 1951	820- 4,265	112	131	5,600	271,669,040	40.0
		Aracas, 1965	3,280- 8,856	136	151	7,530	106,593,240	41.0
		Buracica, 1959	1,476- 1,840	185	214	7,430	133,117,320	35.0
		Faz. Imbe, 1964	2,130- 5,575	55	58	1,720	14,019,960	40.0
		Faz. Boc Esperanca, 1966	7,215- 8,036	12	16	550	14,869,090	39.0
		Faz. Panelas, 1962	2,400- 5,100	11	13	530	6,270,930	37.0
		Malombe, 1966	3,280	15	21	520	6,667,190	41.0
		Mata/Remanso, 1971	4,445- 4,560	75	91	2,460	18,699,570	35.0
		Miranga, 1965	3,280- 3,936	201	232	10,960	180,215,340	40.0
		Rio Dos Ovos, 1979	2,410- 3,750	10	16	330	1,773,720	35.0
		Santana, 1962	2,400- 4,000	4	6	220	5,446,970	37.0
		Sesmaria, 1963	3,100- 4,600	32	37	1,190	2,515,920	40.0
		Candeias, 1941	3,280- 7,415	33	36	2,790	76,395,910	30.0
		Cassarongongo, 1959	1,475- 4,755	39	50	1,520	14,013,670	32.0
		Dom Joao Terra, 1947	920- 1,350	50	70	950	20,007,850	38.0
		Riacho da Bana, 1982	2,910- 3,998	55	58	5,880	8,912,650	39.0
		Taquipe, 1958	3,115- 3,935	71	94	4,270	82,509,600	40.0
		• Candeias Mar, 1941	3,300- 7,400	13	15	600	6,711,220	30.0
		• Dom Joao Mar, 1947	920- 3,000	285	296	4,910	79,927,590	38.0
		• Ilheus, 1979	1,500	...	...	...	893,150	41.0
		Cexis, 1983	1,670- 5,230	17	19	2,030	2,239,170	30.0
		Faz. Balsamc, 1983	2,500- 4,000	70	101	5,530	3,251,830	31.0
		Rio Pojuca, 1982	5,600- 6,200	19	21	2,320	3,006,520	35.0
		Faz. Alvoraca, 1983	2,100- 4,900	32	58	4,190	2,415,280	31.0
		Rio do Bú, 1984	2,900- 3,000	22	26	1,910	930,890	33.0
		Other	...	130	155	3,200	20,693,180	...
	CEARÁ	Faz. Belem, 1980	1,150- 2,500	281	287	2,770	3,188,930	13.0
		• Curima, 1978	6,888	13	17	6,260	14,768,450	32.0
		• Xareu, 1977	5,717- 5,766	17	28	6,000	12,164,470	39.0
		• Atum 1983	5,800- 6,750	8	10	4,360	5,402,940	25.0

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
		• Espada, 1983	5,750- 6,900	6	6	2,070	2,736,060	26.0
	ESPIRITO SANTO	Faz. Cedro, 1962	5,248	10	15	960	9,258,590	28.0
		Sao Mateus, 1969	5,750	53	58	1,700	3,547,450	27.0
		Lagoa Parda, 1977	5,576	40	41	4,600	19,240,500	30.0
		Rio Itaunas, 1977	5,400	35	38	1,310	2,931,050	28.0
		• Cacao, 1978	9,184	4	4	1,480	8,120,130	32.0
		Lagoa Suruaca, 1982	6,400	20	24	2,650	3,956,280	30.0
		Lagoa Piabanha, 1984	6,500	8	11	2,150	1,333,440	27.0
		Other	...	110	131	3,240	5,308,580	...
	RIO DE JANEIRO	• Enchova, 1976	6,973- 7,885	17	17	32,170	60,841,200	23.0
		• Bonito, 1977	6,950- 8,000	12	12	12,160	24,593,100	27.0
		• Garoupa, 1974	11,382	16	17	23,450	54,476,000	30.0
		• Namorado, 1975	10,083	17	21	62,500	76,156,900	28.0
		• Garoupinha, 1974	12,693	3	3	3,640	8,944,100	30.0
		• Pampo, 1977	6,215	24	24	73,180	65,665,200	21.0
		• Area RJS-236 Trilha, 1983	8,800-11,000	5	5	6,690	7,189,200	28.0
		• Linguado, 1981	9,000-11,000	12	12	32,170	41,971,800	20.0
		• Badejo, 1981	8,500-10,500	7	7	9,310	12,869,000	28.0
		• Bicudo, 1982	8,000-11,000	6	6	11,440	27,002,100	22.0
		• Corvina, 1983	9,000-11,000	6	6	15,030	18,051,700	25.0
		• Pirauna, 1982	8,000-10,500	7	7	14,680	16,403,800	27.0
		• Sul de Pampo, 1978	9,300- 9,600	4	4	3,900	6,686,400	20.0
		• Cherne, 1982	9,900-10,200	15	15	29,040	28,429,900	27.0
		• Bagre, 1983	8,700- 9,000	5	5	3,050	2,308,400	25.0
		• Parati, 1982	8,900- 9,200	3	3	2,500	4,138,700	25.0
		• Viola, 1981	9,200- 9,900	5	6	8,650	5,528,700	26.0
		• Marimba, 1983	8,900- 9,200	1	1	1,400	1,302,000	28.0
		• Anequim, 1981	8,200- 8,500	3	3	2,980	2,251,700	27.0
		• Area RJS-150	...	...	...	...	296,070	26.0
		• Moreia, 1984	8,200- 9,500	1	6	2,520	25,200	22.0
	RIO GRANDE DO NORTE	Alto do Rodrigues, 1981	990- 1,120	252	273	4,310	4,239,300	18.0
		• Ubarana, 1973	7,216- 8,365	66	89	18,090	40,575,500	40.0
		• Agulha, 1975	5,412	2	3	280	6,793,000	33.0
		Estreito/Rio Panon, 1983	650- 820	379	421	7,190	6,377,900	16.0
		Macau/Terra, 1982	3,000- 3,300	8	12	460	657,500	31.0
		Lorena, 1984	1,200- 1,700	16	16	640	270,500	28.0
		Upanema, 1985	1,110- 1,800	15	24	2,410	949,800	28.0
		• Area 1-RNS-36, 1982	...	...	...	...	178,290	32.0
		• Macau-Mar, 1986	3,000	2	2	22	2,900	31.0
		Faz. Pocinho, 1982	1,450- 2,000	134	137	4,720	5,484,700	35.0
		Palmeiras, 1982	1,450- 1,800	43	44	860	1,471,800	25.0
		Serraria, 1982	3,200- 3,900	33	37	1,600	1,704,500	27.0
		Guamaré, 1983	1,400- 1,600	35	36	790	1,213,900	25.0
		Canto do Amaro, 1986	2,500- 3,600	26	28	980	358,500	25.0
		Livramento, 1986	2,500- 3,300	14	16	1,240	452,900	41.0
		Other	...	42	47	190	346,000	...
	PARÁ	• Área 1-PAS-11, 1983	...	...	...	...	421,317	41.0
	MARANHÃO	São João, 1983	4,950- 6,200	2	3	50	62,900	40.0
	SERGIPE	Atalaia Sul, 1961	1,450	7	7	220	2,641,700	24.0
		Carmopolis, 1963	2,460	695	739	24,020	152,735,200	24.0
		Riachuelo, 1961	1,475	206	235	3,930	19,102,100	28.0
		Siririzinho, 1967	1,640	161	186	6,050	32,298,100	30.0
		• Caioba, 1969	6,232- 6,890	9	10	2,810	28,662,600	36.0
		• Camurim, 1970	6,232	33	39	4,200	13,535,600	25.0
		• Dourado, 1970	3,620- 3,635	3	5	720	3,597,800	36.0
		• Guaricema, 1968	3,335- 4,430	12	12	5,120	33,392,500	41.0
		• Robalo, 1973	3,300- 4,500	4	5	210	767,400	30.0
		Brejo Grande, 1967	1,670	7	7	530	1,509,500	26.0
		Other	...	86	91	1,440	2,987,780	...
		Total Brazil		**4,880**	**5,539**	**573,963**	**2,029,295,478**	
BRUNEI	SHELL	• Fairley, 1969	10,740	39	62	15,100	102,911,000	40.0
		• Ampa SW, 1963	7,068- 8,155	115	260	36,200	499,413,000	41.0
		• Magpie, 1975	NA	13	32	18,890	60,395,000	31.0
		• Champion, 1970	4,300	93	229	44,370	271,295,000	23.0
		Seria, 1928	NA	345	766	27,410	965,905,000	34.0
		Rasau, 1929	NA	4	14	4,080	2,489,000	30.0
		Other	...	...	...	...	12,998,000	...
		Total Brunei		**609**	**1,363**	**146,050**	**1,915,406,000**	
BURMA[(e)]	MYANMA	Chauk-Lanywa, 1902	1,500- 4,000	450	450	30,000	482,750,000	36.0
		Mann, 1970	1,600- 7,000					37.5
		Myanaung, 1964	2,000- 4,000					40.5
		Prome, 1965	850- 5,000					36.0
		Yenangyaung, 1902	100- 6,700					36.0
		Total Burma		**450**	**450**	**30,000**	**482,750,000**	

		Name of field, discovery date	Depth, ft	No. of wells Producing	No. of wells Total	Production 1986 average B/d	Production Cumulative to Dec. 31, 1986 Bbl	°API gravity
CAMEROON	ELF	• Betika, 1972	5,300	166	170	122,040	303,718,000	42.5
		Ekoundou S., 1975	6,200					24.0
		Kole, 1974	5,500					31.0
		Kombo Center, 1976	5,900					37.0
		Kombo North, 1978	7,200					35.0
		Ekoundou Horst plus Center, 1972	7,200					29.0
		Boa, 1976	5,900					35.0
		Bavo South, 1976	5,600					29.3
		Betika S. Marine, 1979	6,300					30.0
		Ekuondou N. Marine, 1977	5,250					36.0
		Mokoko NE plus Abana, 1977	4,600					29.0
		Asoma Marine, 1973	3,600					19.0
		Kita E. Marine, 1978	6,900					40.8
		Mokoko S. Marine, 1977	3,300					17.0
		Inova Marine, 1976	6,200					32.8
	TOTAL-CFP	• Moudi, 1979	5,250- 5,900	5	5	4,900	8,140,000	40.0
		• Moudi D., 1980	3,300	5	5	2,400	1,500,000	21.3
		Total Cameroon		**176**	**180**	**129,340**	**313,358,000**	
CANADA	ALBERTA	Acheson, 1950	3,390	61	118	9,744	115,326,285	38.0
		Bantry, 1940	2,574- 3,300	143	182	6,169	44,111,132	...
		Bellshill Lake, 1955	2,950	377	412	14,124	53,908,502	...
		Bonnie Glen, 1952	3,959- 6,779	130	168	32,398	487,626,329	34.0-44.0
		Carson Creek N., 1958	8,787- 8,935	40	73	8,604	133,309,420	44.0
		Cessford, 1950	2,800- 3,028	177	253	3,143	28,453,842	...
		Clive, 1951	6,074- 6,208	120	168	5,849	47,197,785	...
		Countess, 1951	2,858- 4,272	114	148	7,761	59,001,322	...
		Fenn-Big Valley, 1950	3,900- 5,400	159	326	28,347	305,539,614	32.0
		Gilby, 1962	4,201- 7,000	81	154	3,541	45,286,011	...
		Golden Spike, 1949	3,570- 5,961	65	82	1,855	180,095,652	36.0
		Harmattan East	...	93	150	5,327	69,418,539	...
		Harmatton Elkton, 1955	8,796-10,757	60	73	5,219	58,772,261	...
		Innisfail, 1956	6,730- 8,440	30	76	5,176	71,662,576	...
		Joarcam, 1949	3,179	187	277	5,245	98,295,261	...
		Joffre, 1953	4,983- 6,779	74	169	3,911	80,461,897	...
		Judy Creek, 1951	8,307- 8,701	174	272	19,469	381,361,148	43.0
		Kaybob, 1957	4,870- 9,577	52	87	6,159	98,491,599	...
		Kaybob S., 1958	5,600-10,042	67	101	11,768	72,945,063	...
		Leduc-Woodbend, 1947	3,062- 5,380	335	727	5,179	373,517,714	40.0
		Lloydminster, 1933	1,690- 1,945	410	836	6,009	45,060,726	...
		Medicine River, 1954	5,435- 7,600	241	334	9,927	63,592,600	...
		Mitsue, 1964	5,908	247	364	23,779	261,992,323	43.0
		Nipisi, 1965	5,648- 5,726	227	319	31,948	251,933,799	41.0
		Pembina, 1953	3,000- 6,133	8,219	3,968	87,970	1,170,013,844	32.0-37.0
		Provost, 1946	2,760- 2,896	794	1,185	13,318	63,840,539	...
		Rainbow, 1965	4,994- 6,160	216	301	43,500	479,774,715	38.0-42.0
		Rainbow South, 1965	6,102- 6,400	49	76	6,260	59,498,458	...
		Red Earth, 1956	4,184- 4,878	170	250	5,289	34,221,257	...
		Redwater, 1948	2,012- 3,200	586	848	16,340	778,540,683	35.0
		Simonette, 1958	10,500	30	42	2,152	36,469,700	...
		Snipe Lake, 1962	8,500	42	95	3,405	51,192,499	...
		Sturgeon Lake S., 1953	4,912- 8,471	91	144	14,324	131,173,620	37.0
		Sundre, 1954	8,700- 9,000	50	63	3,092	34,630,294	...
		Swan Hills, 1957	8,100	569	807	44,194	652,310,742	40.0
		Swan Hills S., 1959	8,400	176	200	20,591	331,906,110	...
		Turner Valley, 1913	3,100- 9,150	107	160	2,756	137,957,334	39.0
		Utikuma Lake, 1963	5,624	109	135	11,625	41,752,564	...
		Virginia Hills, 1957	9,210	122	177	12,318	135,776,855	34.0
		Wainwright, 1925	1,903- 2,200	556	749	9,657	62,028,192	...
		Westerose, 1952	6,818	22	34	12,838	120,025,171	...
		Willisden Green, 1956	5,157	560	777	10,111	110,619,218	...
		Wizard Lake, 1951	4,044- 5,973	35	46	19,339	313,199,295	...
		Zama	3,702	120	238	6,336	71,232,773	33.0-37.0
		Other	...	7,610	11,896	309,102	1,370,072,997	...
	BRITISH COLUMBIA	Boundary Lake, 1957	3,418- 4,575	282	339	11,206	163,627,210	40.0
		Other	...	359	808	23,610	243,482,537	...
	MANITOBA	All fields	...	1,367	1,592	14,195	156,366,516	...
	SASKATCHEWAN	Steelman, 1950	4,600	629	693	8,888	248,641,011	...
		Weyburn, 1955	4,600	718	783	12,472	274,403,014	...
		Other	...	11,919	15,858	180,195	1,581,602,140	...
	ONTARIO	All fields	...	1,070	1,285	2,336	60,212,655	...
	NEW BRUNSWICK	All fields	...	...	...	2	799,207	...
	NORTHWEST TERRITORIES	All fields	...	...	...	25,490	43,795,966	...
		Total Canada		**35,246**	**49,418**	**1,193,562**	**12,388,528,516**	

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1988 average B/d	Cumulative to Dec. 31, 1988 Bbl	°API gravity
CHILE	ENAP-MAINLAND	Canadon, 1962	6,090	13	63	247	14,382,809	38.4
		Daniel, 1960	5,806	10	123	133	34,374,269	25.4
		Daniel Este, 1961	5,523	9	67	395	28,132,817	25.0
		Dungeness, 1962	5,251	3	19	60	3,876,055	28.6
		Posesion, 1960	5,622	36	76	813	20,870,485	63.6
		Other	...	27	116	2,279	21,339,991	...
	TIERRA DEL FUEGO	Calafate, 1955	6,045	13	61	1,232	25,193,443	49.3
		Catalina Sur, 1961	5,779	1	43	3	6,351,315	44.0
		Cullen, 1954	5,730	15	106	416	40,840,764	41.8
		Tres Lagos, 1957	5,724	20	84	439	15,692,645	40.1
		Catalina, 1956	5,756	20	26	3,713	5,551,964	38.7
		Other	...	39	254	1,637	57,246,778	...
	STRAIT OF MAGELLAN	Ostion, 1977	7,156	14	18	1,784	7,188,534	33.0
		Posesion, 1977	6,727	11	39	1,024	4,767,640	34.5
		Spiteful, 1977	6,298	42	82	6,895	39,176,273	34.5
		Spiteful Norte, 1978	7,150	9	58	1,197	8,921,721	39.0
		Daniel Este-Dungeness, 1977	6,126	27	30	2,684	2,277,095	35.9
		Pejerrey, 1984	7,[illegible]29	38	60	8,485	5,406,984	39.0
		Total Chile		**347**	**1,325**	**33,436**	**341,591,546**	
CHINA[(e)]	WESTERN REGION: JUNGGAR BASIN, TARIM BASIN, TURPEN BASIN	Karamay, 1955	...	...	...	...	107,622,000	...
		Dushanzi, 1941	...	...	...	...	40,728,000	...
		Other	...	...	...	105,500	420,393,500	...
	CENTRAL REGION: JIUQUAN BASIN	Yumen, 1938	...	...	...	12,700	204,069,500	...
	CENTRAL REGION: SICHUAN BASIN	All fields	...	...	...	2,100	151,300,500	...
	CENTRAL REGION: SHAN-GAN-NING BASIN	Chang Qing, 1978	...	...	...	29,600	73,363,000	...
		Yanchang, 1907	...	...	...	2,500	58,483,500	...
	CENTRAL REGION: QAIDAM BASIN	Qinghai, 1955	...	...	...	2,100	36,646,500	...
		Lenghu 3,4,5, 1958	...	...	...	10,700,000	...	
		Other	...	...	...	...	52,548,000	...
	EASTERN REGION: SONGLIAO BASIN	Daqing, 1959	...	...	...	1,130,500	5,643,842,500	...
		Fuyn, 1958	...	...	...	12,100	249,122,500	...
		Jilin, 1978	...	...	...	38,500	88,592,500	...
	EASTERN REGION: BOHAI BASIN	Shengli, 1962	...	...	...	630,500	2,152,128,500	...
		Renqiu, 1975	...	...	...	207,500	815,372,500	...
		Liaohe, 1964	...	...	...	190,900	528,714,500	...
		Dagang, 1964	...	...	...	65,000	380,892,000	...
		Zhongyuan, 1981	...	...	...	115,500	153,507,500	...
		Itu, 1970	...	...	...	...	19,600,000	...
	EASTERN REGION: JIANGHAN BASIN	Qianjiang, 1966	...	...	...	...	181,382,000	...
		Other	...	...	...	21,100	112,080,500	...
	EASTERN REGION: NANXIANG BASIN	Nanyang, 1971	...	...	...	46,500	207,637,500	...
	EASTERN REGION: SUBEI BASIN	All fields	...	...	...	7,400	27,856,000	...
		Total China		**34,000**	**NA**	**2,620,000**	**11,716,583,000**	
CHINA, TAIWAN	CHINESE PETROLEUM	Tiechengshan,[(c)] 1959	...	28	33	1,164	14,750,213	51.0
		Chingtsohu,[(c)] 1967	...	5	18	212		50.0
		Yunghoshan,[(c)] 1971	...	25	31	344	6,131,707	45.0
		Chuhuangkeng,[(c)] 1960	...	23	25	172		50.0
		• CBK, 1986	...	9	9	...	20,440	47.0
		Total China, Taiwan		**90**	**116**	**1,892**	**20,902,360**	
COLOMBIA	ECOPETROL	Galán, 1945	3,200	62	71	1,043	21,084,000	19.0
		Infantas, 1918	3,200	263	307	2,575	223,287,000	25.8
		La Cira, 1925	3,250	612	703	8,600	459,936,000	24.0
		Lis-Nutria, 1957	9,500	130	137	6,479	34,509,000	31.0
		Llanito, 1960	7,300	60	61	5,381	20,351,000	21.0
		Cantagallo, 1941	6,800	11	13	652	18,052,000	19.7
		Casabe, 1941	3,800	330	416	7,482	220,557,000	20.7
		Yarigui, 1954	8,700	58	59	7,794	108,377,000	19.5
		Boquete, 1961	8,000	12	20	427	17,070,000	43.0
		Cicuco, 1956	...	5	22	301	43,287,000	...
		Petrolea, 1933	...	6	21	96	36,851,000	...
		Tibú, 1940	...	189	261	4,876	225,105,000	...
		Ortega, 1951	...	6	6	400	11,328,000	28.0
		Apiay, 1981	10,500	9	22	6,334	8,220,000	23.0
		Orito, 1963	6,600	58	95	10,706	186,054,000	40.0
		Other	...	129	215	7,516	82,652,000	...

		Name of field, discovery date	Depth, ft	No. of wells Producing	No. of wells Total	Production 1986 average B/d	Production Cumulative to Dec. 31, 1986 Bbl	°API gravity
	INTERCOL	Bonanza, 1963	4,000	15	15	921	12,413,000	30.0
		Provincia, 1962	8,000	65	65	15,110	150,692,000	33.0
		Arauca, 1980	18,000	4	4	1,106	3,667,000	41.0
		Other	...	...	...	...	667,000	...
	HOCOL (TENNECO)	Dina K, 1969	6,500	23	32	6,532	23,551,972	22.0
		Dina T, 1962	3,600	47	59	6,080	18,121,570	20.0
		Palogrande, 1971	6,500	22	30	5,556	11,102,790	20.0
		Cebu, 1981	6,500	12	12	2,935	6,114,366	19.0
		Brisas, 1973	4,200	4	6	675	4,203,193	23.5
		Pijao, 1981	7,000	6	7	880	3,215,736	21.0
		Hato Nuevo, 1984	6,900	3	4	867	1,222,517	36.0
		Tello, 1972	7,500	31	33	9,322	36,100,651	22.0
		La Canada, 1966	700	5	7	129	1,002,927	22.0
		San Francisco, 1985	2,800	27	28	10,522	4,994,846	27.0
		Tenay, 1985	11,500	2	2	1,471	607,815	36.3
		Loma Larga, 1985	3,500	1	1	10	8,935	22.4
		La Jagua, 1986	5,300	1	1	211	77,124	22.0
	ELF AQUITAINE	Trinidad, 1974	9,000	2	2	1,808	2,003,092	32.4
		Barquerena, 1982	9,300	2	2	2,267	1,696,799	32.3
		Cano Garza Norte, 1983	7,900	1	1	865	1,074,690	40.2
		Cano Garza, 1979	7,900	2	2	1,235	724,695	40.2
		Tocaria, 1980	13,500	2	2	1,000	345,950	32.1
		Cravo Sur, 1982	10,600	1	1	934	990,400	40.2
		Gloria Norte, 1983	12,100	1	1	867	320,457	17.2
	ARGOSY	Bourdine, 1974	11,000	3	3	871	2,834,000	24.1
		Máxime, 1976	11,000	1	1	...	111,000	26.3
		Nancy, 1974	11,000	1	1	276	1,754,000	25.5
	SHELL	Sta. Rosa, 1984	...	1	1	27	52,492	...
	OCCIDENTAL	Payoa, 1962	8,000	15	39	1,167	68,930,513	27.0
		Salina, 1936	2,500	51	71	3,482	11,391,686	28.0
		Caño Limón, 1984	7,600	6	6	20,756	7,925,762	29.0
		La Yuca, 1984	7,600	16	17	69,806	25,640,437	29.4
		Matanegra, 1984	7,600	6	7	20,093	7,350,397	29.7
	TEXACO	Cocorná, 1963	2,100	48	54	3,317	12,298,122	12.0-13.0
		Palagua, 1956	5,000	107	167	4,248	78,931,000	14.0-17.0
		Tisquirama, 1963	8,000	3	9	469	4,498,018	16.0-28.0
		Velasquez, 1946	7,500	120	302	4,735	163,249,342	19.0-24.0
	TEXACO-ECOPETROL	Teca, 1981	2,100	143	148	15,023	14,624,489	12.0-13.0
		Other	...	11	41	607	4,608,118	11.2-26.1
	CHEVRON	Rio Zulia, 1961	5,700	...	24	1,433	126,986,934	41.0
		Castilla, 1969	6,500	16	18	10,219	16,288,686	13.5
		Chichimene, 1969	6,500	1	1	490	190,394	21.3
	LASMO	Santiago, 1985	9,600	2	2	1,100	263,000	29.0
		Total Colombia		**2,770**	**3,658**	**300,084**	**2,550,197,915**	
CONGO[e]	**AGIP-ELF**	● Loango, 1972	3,000	49	52	114,266	361,968,000	26.8
	ELF CONGO	● Emeraude, 1969	820	113	113			21.8
		● Likouala, 1979	4,270	28	28			33.1
		● Yanga, 1979	2,950	47	47			29.4
		● Sendji, 1973	3,940	41	41			30.1
		Pointe Indienne, 1951	5,000	3	3			36.9
		Mengo, 1979	6,500	3	3			34.0
		Kundsi, 1980	4,000	2	2			35.8
		Total Congo		**286**	**289**	**114,266**	**361,968,000**	
DENMARK	**DUC**	● Dan, 1971	6,000- 6,400	...	...	8,023	30,833,168	30.7
		● Gorm, 1971	6,500- 7,000	...	...	29,569	57,612,039	34.7
		● Skjold, 1977	5,000	...	...	18,496	18,876,358	29.6
		● Rolf, 1981	...	...	...	8,085	2,948,748	37.7
		● Tyra,[c] 1986	...	...	...	9,751	6,209,509	56.6
		Total Denmark		...	...	**73,924**	**116,479,822**	
DUBAI	**DUPETCO[a]**	● Fateh, 1966	7,900- 9,000	141	156	314,760	1,767,685,000	31.8
		● S.W. Fateh, 1970	7,500- 9,000					30.3
		● Falah, 1972	8,100					25.5
		● Rashid, 1973	9,400-11,500					38.0
	ARCO	Margham, 1981	11,200	9	14	19,490	17,266,000	43.5
		Total Dubai		**150**	**170**	**334,250**	**1,784,951,000**	

		Name of field, discovery date	Depth, ft	No. of wells		Production		°API gravity
				Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	
ECUADOR	**TEXACO**	Lago Agrio, 1967	10,175	17	34	8,216	106,194,241	28.5
		Sacha, 1969	10,160	88	106	61,577	325,283,446	28.0
		Shushufindi, 1959	9,772	47	67	110,486	470,524,403	30.0
		Aguarico, 1968	9,850	4	10	6,305	41,153,480	27.2
		Auca, 1970	10,578	16	24	17,098	61,641,497	28.0
		Auca Sur-1, 1980	10,578	2	2	782	972,888	28.0
		Atacapi, 1968	9,855	3	5	1,964	11,285,030	31.0
		Parahuacu, 1968	10,173	2	5	485	5,853,014	30.0
		Yuca, 1970	10,423	5	12	3,809	9,475,121	28.0
		Yuca Sur-1, 1979	10,423	1	1	288	854,864	28.0
		Yulebra, 1980	10,345	2	2	1,460	1,841,319	21.4
		Culebra, 1973	10,626	1	1	688	1,554,520	17.5
		Cononaco, 1972	11,233	10	12	18,321	17,768,821	33.3
		Dureno, 1986	10,290	1	1	595	530,123	31.0
		Guanta, 1986	9,575	3	3	1,586	578,773	29.7
		Rumiyacu, 1982	10,191	1	1	...	184,939	21.0
	CLYDE PETROLEUM	Mariann, 1971	7,000	5	5	1,016	3,348,617	20.0
		Fanny, 1972	7,700	7	8	3,719	8,352,469	22.5
		Tarapoa, 1973	8,300	2	2	321	842,110	20.0
	CEPE-ORIENTE(e)	Shushuqui, 1980	9,200	6	6	48,284	164,230,800	28.8
		Shuara, 1980	9,100	8	8			29.6
		Secoya, 1980	9,100	15	15			30.3
		Charapa, 1967	10,000	12	12			30.0
		Cuyabeno, 1972	8,050	4	4			28.8
		Sansahuari, 1979	8,100	1	1			28.8
		Tetete, 1980	9,300	5	5			28.0
		Bermejo, 1967	5,000	9	9			34.0
	CEPE-PENINSULA(e)	Ancon, 1921	4,000	475	475			35.6
		Carpet	...	70	70			...
		Cautivo	...	100	100			...
		Total Ecuador		**922**	**1,006**	**287,000**	**1,232,470,464**	
EGYPT	**GUPCO/AMOCO**	• El Morgan, 1965	5,100- 6,400	88	106	115,748	967,000,000	27.0-32.0
		• July, 1973	8,100-10,000	33	41	68,338	422,200,000	31.0-34.6
		• Ramadan, 1974	11,300	19	25	47,719	346,500,000	31.7
		• October, 1978	11,000	20	27	116,112	253,900,000	28.0
		• Shoab Ali, 1978	5,500	19	50	17,670	120,600,000	30.0
		• SG-300, 1976	5,876	1	2	5,117	16,900,000	24.8
		• Sidki (382), 1977	10,500	5	7	7,570	35,400,000	33.9
		• GS (365) 1980	10,140	...	1	...	490,000	32.0
		• GS (277), 1980	8,610	...	1	1,502	1,900,000	34.0
		• SB (305), 1981	8,100	1	1	610	1,800,000	30.0
		• Badri (315), 1981	6,400	20	30	19,586	28,500,000	27.0
		• Younis (347), 1981	4,300	4	5	4,218	9,500,000	32.0
		• GH (376), 1981	8,600	2	4	2,392	4,600,000	25.0
		• SB (339), 1981	4,600	1	1	296	340,000	29.5
		• Nessim (336), 1981	6,700	2	3	1,867	8,400,000	26.9
		• Hilal (404), 1982	9,200-10,000	4	6	29,317	25,700,000	32.0
		• Waly (356), 1982	6,900	1	3	555	2,600,000	35.0
		• GS (345/346), 1982	7,500	...	2	561	1,100,000	38.0
		• SB (367), 1984	7,000	1	1	1,786	1,020,000	38.0
		• GS (381), 1985	8,700	...	1	2,307	920,000	37.0
		Abu Gharadig, 1972	9,500	15	24	10,725	46,000,000	36.0
		WD-33, 1972	9,800-10,800	...	1	39	2,100,000	32.0
		Razzak and E. Razzak, 1972	7,000	10	15	3,546	49,700,000	36.0
		• GS-327, 1983	5,600	1	1	772	280,000	20.0
		• SB-294, 1986	11,600	1	1	746	290,000	30.5
		NAG-9/9-1, 1985	10,000	2	2	828	510,000	35.0
		NEAG-9/15, 1984	10,635-12,128	...	3	357	130,000	35.0
		WD-33/15, 1985	5,800	1	1	8	2,000	30.0
	PETROBEL(e)	Belayim Onshore, 1954	7,000- 8,500	34	55	44,163	411,899,082	22.5
		• Belayim Marine, 1961	8,500	94	110	120,388	509,891,833	29.5
	WEPCO/PHILLIPS PETROLEUM	El Alamein, 1966	8,700	17	19	2,028	65,517,658	33.6
		Umbarka, 1976	10,700	5	5	2,510	4,771,566	43.9
		Yidma, 1971	9,000	3	5	1,252	21,389,262	44.0
	EGPC(e)	Gharib, 1938	2,200- 4,500	81	215	4,465	246,492,293	24.3
		Bakr/W. Bakr, 1958/1978	3,200- 1,500	48	83	3,657	75,561,079	18.0-19.0
		Umel Yusr, 1968	3,000- 3,300	19	37	2,768	33,122,888	21.5
		Amer, 1965	3,500	21	39	3,515	11,759,452	21.5
		El Ayoun, 1968	3,300	5	12	343	6,109,210	22.0
		Kareem, 1958	2,300	6	35	364	10,888,670	16.6
		Kheir, 1973	1,050	1	4	61	1,017,853	28.5
		Shukheir, 1966	2,500	5	11	586	2,988,681	34.0
		Ras El Behar, 1983	4,500	6	11	7,536	11,129,470	32.5
		Esh Elmalaha	3,700	2	2	162	92,465	44.0
		Sudr, 1946	2,600	12	20	1,333	49,062,901	21.6
		Asl, 1947	3,000	3	6	950	41,222,383	21.6

		Name of field, discovery date	Depth, ft	No. of wells: Producing	No. of wells: Total	Production: 1986 average B/d	Production: Cumulative to Dec. 31, 1986 Bbl	°API gravity
		Matarma, 1948	2,000	2	2	141	1,793,785	14.6
		El Khaligue, 1980	1,600	...	1	...	188,760	29.4
		Abu Senan T&Y, 1981	6,000	12	20	2,000	2,536,085	...
		Harghada, 1913	...	NA	NA	81	29,565	...
	SUCO	• Ras Budran, 1978	11,400	16	16	41,698	44,041,848	25.0
		• LL 87-2, 1975	11,000	...	1	40	771,246	35.0
		• Ras Fanar, 1978	2,300	6	6	10,788	13,565,346	35.0
		• Zeit Bay, 1981	4,200	22	22	60,669	54,180,124	33.0
	OSOCO/TOTAL	• Shukheir Bay, 1978	6,300	1	1	538	1,746,299	34.5
		• S. Ramadan, 1982	10,000	2	2	771	399,507	36.5
	EPEDECO	West Bakr, 1978	1,300- 1,500	20	25	4,849	10,022,835	18.0
	BADR PETROLEUM/SHELL	Badr el din, 1982	10,800	6	6	11,120	11,759,000	38.0
	EGYPTCO	Meleha, 1972	6,000	12	12	1,354	687,371	40.0
	GEYSUM	• Geysum, 1980	5,500	5	5	4,808	2,095,688	17.0
	SUESSO (ESSO)	• East Zeit, 1982	11,000	4	4	3,277	1,196,000	38.0
	SHUKAIR MARINE CO.	O. Suco	...	1	1	525	1,673,898	...
	EL ALAMEIN	Mors	...	1	1	283	103,236	...
	KHALDA	Salam	...	1	1	61	22,122	...
		Total Egypt		**724**	**1,160**	**799,378**	**3,998,111,461**	
FRANCE	**ALSACE**	All fields	...	14	28	473	2,829,443	...
		Abandoned	...	...	...	...	24,310,359	...
	AQUITAINE BASIN	Lacq Superieur, 1949	2,170	40	57	977	25,233,562	22.3
		Parentis, 1954	7,710	61	73	6,492	194,088,976	33.4
		Lugos, 1956	5,250	19	25	822	9,666,101	20.8
		Cazaux, 1959	7,550	36	45	5,083	66,180,650	34.2-37.0
		Lavergne, 1962	11,480	4	4	407	12,004,302	41.7
		Pecorade, 1974	10,660	10	14	2,658	8,140,273	29.3
		Castéra-Lou, 1976	9,600	8	9	655	2,174,566	21.7
		Vic Bilh, 1979	7,100	24	39	5,644	12,634,755	26.6
		Lagrave, 1984	6,500	3	3	3,559	2,545,890	42.5
		Other	...	8	29	540	18,920,333	...
		Abandoned	...	...	...	...	70,857	...
	PARIS BASIN	Blandy, 1984	7,410	1	3	397	478,065	36.0
		Coulommes, 1958	6,230	34	48	460	13,070,626	32.6
		Châteaurenard, 1958	1,800	22	42	396	4,604,978	27.5
		St. Martin, 1959	4,590	11	15	341	8,234,164	33.0
		Villeperdue, 1959	6,100	75	95	9,526	6,108,049	34.4
		St. Firmin, 1960	1,800	35	58	606	9,612,284	27.5
		Chuelles, 1961	1,800	36	57	571	6,691,654	27.5
		Soudron, 1976	4,600	20	27	503	1,752,898	34.4
		Donnemarie, 1979	8,040	2	3	851	1,536,144	36.2
		Chaunoy, 1983	7,350	38	43	13,294	10,386,281	37.1
		St. Germain, 1984	7,200	8	9	1,965	1,030,629	36.0
		Other	...	74	186	3,021	24,014,006	...
		Abandoned	...	...	...	294,385	...	
	SOUTHEAST + JURA	All fields abandoned	...	...	...	...	223,063	...
		Total France		**583**	**912**	**59,241**	**466,847,293**	
GABON	**ELF**	• Anguille, 1962	9,200	214	330	124,298	865,478,000	31.2
		• Anguille NE, 1968	7,500					32.0
		• Anguille NNE, 1971	7,500					32.0
		• Barbier, 1972	6,000					29.5
		• Breme, 1976	5,000					36.5
		Clairette, 1956	4,400					29.0
		• Girelle, 1973	9,400					32.0
		• Gonelle, 1972	5,800					24.2
		• Grondin, 1971	7,500					16.4
		• Mandaros, 1972	4,900					19.8
		Olende, 1976	6,700					33.8
		• P.G.S. Marine, 1975	7,500					32.5
		• Port Gentil Ocean, 1964	6,500					33.0
		Tchengue, 1957	4,100					26.8
		• Torpille, 1968	8,200					35.8
		• Baliste, 1974	4,900					28.3
		• M'Bya Sud, 1969	6,700					35.4
		• Anguille SE, 1962	8,200					32.8
		• Ayol Marine, 1979	7,700					22.8
		• Baudroie N., 1980	7,500					34.5
		• Baudroie Marine, 1968	7,500					33.3
		Other	...					...

		Name of field, discovery date	Depth, ft	No. of wells		Production		°API gravity
				Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	
	SHELL GABON	Gamba/Ivinga, 1963	3,000- 3,100	53	68	12,650	249,717,000	31.6
		Lucina-Marine, 1971	5,900	15	16	11,370	44,750,000	38.4
		Lucina-Marine W., 1962	...	...	...	1,410	1,215,000	37.0
	AMOCO	Oguendjo B and C, 1981	5,000- 6,000	13	14	11,292	18,100,000	35.0
		Total Gabon		**295**	**428**	**161,020**	**1,179,280,000**	
GHANA(e)	**AGRI-PETCO**	● Saltpond, 1977	8,500	...	3	...	3,938,000	36.0-39.0
		Total Ghana		...	**3**	—	**3,938,000**	
GREECE	**N. AEGEAN PET. CORP.**	● Prinos, 1974	8,000- 8,800	16	16	26,500	44,112,706	30.6
		Total Greece		**16**	**16**	**26,500**	**44,112,706**	
GUATEMALA(e)	**MEM**	Rubelsanto, 1974	5,300- 7,000	5	5	4,962	13,477,000	26.0-30.0
		West Chinaja, 1977	3,200- 3,800	3	3			35.0-43.0
		Caribe, 1981	6,830- 7,280	3	3			22.0-24.0
		Tortugas	2,300	...	2			35.0
		Tierra Blanca	11,230	...	1			19.5
		San Diego, 1981	17,150	1	1			34.7
		Total Guatemala		**12**	**15**	**4,962**	**13,477,000**	
INDIA	**GUJARAT STATE**	Ankleshwar, 1960	2,953- 3,937	2,670	3,413	634,356	1,779,878,489	
		Bakrol, 1968	4,593- 4,921					
		Kadi, N., 1968	2,953- 3,909					
		Kadi, S., 1968	5,906- 6,562					
		Kalol, 1961	4,265- 5,250					
		Kathana, 1965	5,250- 5,906					
		Kholka, 1966	4,265- 5,577					
		Kosamba, 1963	1,968- 2,625					
		Nawagam, 1963	4,429- 6,652					
		Sanand, 1963	4,265- 4,593					
		Sobhasen, 1968	4,429- 5,906					
		Wovel, 1963	4,265- 4,593					
	ASSAM STATE	Digboi, 1890	300- 7,500					
		Geleki, 1968	12,632-12,795					
		Lakwa, 1965	8,038-12,795					
		Moran, 1958	11,000					
		Nahorkatiya, 1953	9,500					
		Rudrasagar, 1961	10,171-10,500					
	MAHARASHTRA STATE	Bombay High, 1974	4,530- 4,630					
		Total India		**2,670**	**3,413**	**634,356**	**1,779,878,489**	
INDONESIA	**PERTAMINA UEP I(e)**	Besitang, 1977	3,973	204	226			51.5
		Gebang, 1977	2,917					54.0
		K. Simpang, 1971	3,740- 5,019					45.0
		P. Tabuhan, 1937	3,350- 5,893					50.8
		Rantau, 1929	2,764					45.3
		Serang Jaya, 1926	3,701					47.5
		Other	...					...
	PERTAMINA UEP II(e)	Benuang, 1942	6,103	412	1,419			35.1
		Benakat East, 1973	NA					NA
		Tempino, 1931	1,647					23.0
		Gn. Kemala, 1938	5,448					38.0
		Limau, 1928	3,896- 4,626					NA
		Ogan Timur, 1943	3,793					27.42
		Talang Jimar, 1937	4,123					31.0
		T. Miring, 1935	640					NA
		Tanjung Tiga, 1938	3,750					28.0
		Kenali Asam, 1931	2,077					29.0
		Belimbing	5,371					...
		Kuang, 1940	5,249					25.1
		Other	...					...
	PERTAMINA UEP III(e)	Cemara, 1976	3,964- 7,104	88	184			...
		Jatibarang, 1969	3,063					29.0
		Tugu Barat, 1979	3,014					...
		Other	...					...
	PERTAMINA UEP IV(e)	Bunyu, 1923	2,077	161	334			33.2
		Sangatta, 1939	1,842					33.0
		Tanjung, 1938	2,296					39.9
		Tapian Timur, 1967	4,396					38.8

	Name of field, discovery date	Depth, ft	No. of wells Producing	No. of wells Total	Production 1986 average B/d	Production Cumulative to Dec. 31, 1986 Bbl	°API gravity
	Warukin S., 1966	2,067			107,688	2,579.576,000	26.9
	Other	...					...
PERTAMINA UEP V(e)	Klamono, 1936	574	47	55			19.0
	Linda, 1977	3,281					19.0
	Sele, 1951	2,156					35.0
PERTAMINA (FROM STANVAC)(e)	Sago, 1940	1,800	354	354			34.0
	Lirik, 1939	1,600					34.0
	Molek, 1956	2,600					34.0
	N. Pulai, 1941	1,800					34.0
	S. Pulai, 1941	1,800					34.0
	Talang Akar, 1922	2,800					35.0
	Benakat, 1932	1,600					35.0
	Jirah, 1930	2,300					35.0
	Rajah, 1940	6,000					38.0
	Abab, 1951	6,000					36.0
PERTAMINA (N.E. KALIMANTAN)(e)	Sembakung, 1976	2,600	17	19			36.0
	Bangkudulis, 1980	3,250	...	1			39.5
PHILLIPS GROUP(e)	Salawati, 1976	5,749	7	13			39.2
AARNL(e)	Bula	280- 700	49	106			22.5
LEMIGAS(e)	All fields, 1893-1909	2,155- 2,297	71	419			...
CAL ASIATIC TOPCO	Batang, 1975	690	7	10			19.2
	Buaya, 1978	2,035	1	1			28.0
	Lindai, 1971	1,100	14	16			30.7
	Menggala S., 1968	3,765	1	1			33.5
	Tanjung Medan, 1976	2,770	2	7			37.6
	Benua, 1978	2,400	14	17			41.4
	Beruk, 1974	1,750	19	23			38.0
	Bungsu, 1976	2,050	7	8			38.4
	Damar, 1974	4,650	5	6			33.5
	Dusun, 1979	2,550	5	6			42.3
	Gatam, 1977	2,385	2	2			33.5
	Kasikan, 1972	660	18	24			27.3
	Beruk NE, 1976	1,800	3	5			40.0
	Osam, 1978	900	5	5			31.8
	Paitan, 1978	2,315	1	1			31.6
	Pedada, 1973	950	26	27			33.1
	Pusaka, 1977	2,250	17	21			34.6
	Sabak, 1974	2,350	13	13			35.8
	Terantam, 1973	900	4	4			31.7
	Zamrud, 1975	3,600	42	46			40.3
	Langgak, 1976	1,380	18	20			31.7
ASAMERA (NORTH SUMATRA)(e)	Geudondong, 1965	3,192	...	23			53.1
	Julu Rayeu, 1968	2,832	10	36			53.6
	Iee Tabeu, 1971	2,721	4	47			50.3
	Alur Cimon, 1972	3,098	...	24			50.8
	Tualang, 1973	2,631	14	53			49.9
	Peudawa, 1980	3,083	...	12			48.1
	Other	...	...	11			...
ASAMERA (SOUTH SUMATRA)(e)	Kluang, 1913	2,591	32	74			42.6
	Mangunjaya, 1934	2,700	8	99			32.0
	Tanjung Laban, 1982	3,590	10	14			38.1
	Ramba, 1982	3,150	47	60			37.0
	Rawa, 1985	4,038	1	13			38.7
	Other	...	...	7			...
	Tempino, 1931	4,493	3	9			40.9
	Bentayan, 1932	4,446	5	8			22.0
	Panerokan, 1976	4,915	3	5			39.4
IIAPCO	● Cinta, 1970	3,500	37	46	15,214	166,355,000	34.0
	● Gita, 1972	5,000	6	9	1,027	6,939,000	34.5
	● Kitty, 1973	2,700	6	7	1,014	13,212,000	18.0
	● Nora, 1973	3,200	3	5	427	8,513,000	29.0
	● Rama, 1974	3,200	44	75	8,260	86,205,000	31.0
	● Selatan, 1971	4,000	9	19	1,718	19,883,000	19.5
	● Zelda, 1971	7,500	31	43	9,282	32,132,000	33.0
	● Krisna, 1979	4,500	29	41	8,556	54,258,000	37.0
	● Yvonne, 1980	4,500	9	11	6,608	9,699,000	36.0
	● Farida, 1982	8,000	14	22	2,373	9,526,000	32.0
	● Titi, 1982	8,000	...	4	...	1,654,000	33.0
	● Sundari, 1982	4,400	12	15	3,622	8,520,000	25.0
	● Duma, 1983	2,300	3	6	737	589,000	16.0
	● Karmila, 1983	4,800	7	9	16,370	21,978,000	36.0
	Wanda, 1984	4,800	2	5	1,159	1,466,000	36.0
PETROMER TREND	Canderawasih, 1976	3,500	9	14	1,199	11,234,294	27.8
	Jaya, 1973	3,050	13	17	2,415	34,715,067	42.0
	Kasim, 1972	3,350	33	40	4,832	44,026,032	38.0
	Walio, 1975	2,750	218	237	18,786	140,256,771	34.2
	Other	...	9	19	555	11,194,940	...

			No. of wells		Production		
	Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
CALTEX	Aman, 1974	4,700	10	10	3,385	5,831,920,956	42.1
	Anatara, 1978	1,425	5	5	1,016		35.7
	Balam SE, 1972	4,500	13	13	545		29.6
	Balam S., 1969	1,600	48	48	9,909		33.3
	Bangko, 1970	1,950	70	79	30,397		33.8
	Batang CPI, 1975	690	5	7	227		18.8
	Bekasap, 1955	2,950	49	60	17,505		33.4
	Bekasap S., 1968	3,900	8	11	1,052		34.1
	Benar, 1973	2,450	25	26	5,296		32.9
	Cebakan, 1974	4,700	4	4	715		30.1
	Garuk, 1980	4,600	2	2	37		30.6
	Hitam, 1975	6,690	4	5	1,358		38.7
	Intan, 1977	3,350	6	6	1,091		32.8
	Jorang, 1972	5,500	13	15	8,101		38.2
	Kerang, 1977	3,900	11	13	1,406		37.3
	Kopar, 1974	5,300	12	18	1,757		37.1
	Kotabatak, 1952	5,500	65	113	21,371		28.9
	Libo, 1968	6,000	8	10	1,328		34.3
	Libo SE, 1973	5,900	23	27	11,385		42.0
	Lincak, 1981	2,570	4	4	914		35.2
	Menggala N., 1968	3,850	14	17	4,905		32.5
	Menggala S. CPI, 1968	3,765	7	8	2,110		33.5
	Minas, 1944	2,600	421	553	254,314		34.7
	Mindal, 1971	3,400	2	3	116		36.0
	Mutiara, 1976	3,500	2	2	106		34.1
	Nella, 1977	5,000	3	3	179		34.7
	Obor, 1978	7,370	1	1	174		39.9
	Pager, 1974	4,300	23	25	7,531		37.3
	Pelita, 1977	6,600	5	5	799		38.4
	Pematang, 1959	3,750	36	43	8,310		31.6
	Pematang Bow, 1969	5,300	4	8	1,162		34.8
	Pemburu, 1981	2,300	8	9	3,782		35.3
	Perkebunan, 1977	2,300	1	1	21		29.4
	Petani, 1964	4,750	32	34	11,548		32.8
	Petapahan, 1971	4,500	21	26	5,846		27.9
	Pinang, 1971	3,950	19	20	3,318		32.4
	Pinggir, 1972	3,300	5	6	264		34.7
	Pinggir S., 1973	3,300	2	2	64		38.5
	Pudu, 1972	5,950	6	12	1,517		36.1
	Puncak, 1979	2,400	12	12	4,569		35.3
	Pungut, 1951	3,400	27	27	5,594		37.7
	Rangau, 1968	6,100	3	10	158		42.0
	Rantaubais, 1972	1,070	14	16	377		21.0
	Rokiri, 1979	6,100	...	2	...		41.3
	Seruni, 1972	3,000	22	23	3,653		35.7
	Sikladi, 1975	4,340	18	18	2,301		38.2
	Singa, 1977	3,200	1	1	46		31.0
	Sintong, 1971	3,400	19	19	2,419		32.2
	Sintong SE, 1973	4,500	1	1	20		36.1
	Suram, 1971	1,750	3	6	235		27.6
	Topaz, 1977	5,200	7	7	2,273		33.0
	Topi, 1979	3,630	1	1	63		36.7
	Tandun, 1969	3,000	9	9	816		34.3
	Telinga, 1975	4,205	7	8	800		33.6
	Tunas, 1983	4,819	2	2	166		35.0
	Ubi, 1976	4,350	20	21	1,609		35.8
	Waduk, 1982	6,100	10	11	891		37.6
	Duri, 1941	770	1,012	1,228	69,339		21.4
	Kulin, 1970	2,050	55	61	4,223		20.0
STANVAC (CENTRAL SUMATRA)	Binio, 1972	1,600	22	22	550	11,506,000	34.0
	Pekan, 1976	3,700	22	22	1,000	7,284,000	35.0
	Merbau, 1979	2,700	23	29	1,790	5,860,000	36.0
	Kerumutan, 1980	3,000	21	26	1,262	4,287,000	35.0
	N. Merbau, 1980	2,600	8	17	663	2,651,000	36.0
	Panduk, 1981	2,500	6	6	272	1,237,000	46.0
	Kayuara, 1982	3,700	7	9	575	1,426,000	35.0
	Gemuruh, 1983	2,800	17	19	1,975	1,081,000	34.0
	E. Kayuara, 1983	3,500	47	51	5,500	2,546,000	35.0
	Mutiara, 1985	2,700	2	2	91	807,000	34.0
	Other	4,600	...	...	...	9,175	...
STANVAC (SOUTH SUMATRA)	Ibul, 1970	5,700	11	16	1,270	21,390,000	36.0
	Rambutan, 1972	4,500	2	3	160	3,197,000	42.0
	Tabuan (PSC)	4,000	...	...	...	419,610	34.0
	Other	4,500	...	...	...	797,023	...
ARCO	Ardjuna, 1969	2,380- 7,250	266	330	136,930	599,181,000	37.0
	Arimbi, 1972	2,943	10	12	2,580	21,725,000	33.0
ROY M. HUFFINGTON INC.	Badak, 1972	5,190-10,600	44	52	6,020	35,978,627	32.0
	Nilam, 1974	7,500-11,500	35	39	7,363	16,393,901	32.0

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
		Pamaguan, 1974	900- 5,100	14	- 27	2,343	5,170,144	30.0
		Mutiara, 1984	900- 5,800	12	19	2,740	2,005,815	30.0
		Semberah, 1974	2,900-10,100	...	16	...	7,054	35.0
	TOTAL CFP	● Tambora, 1984	8,000-13,000	15	34	6,000	4,182,000	33.0
		● Handil, 1974	2,900- 9,200	190	258	130,000	575,339,000	33.0
		● Bekapai, 1972	4,600- 5,600	38	41	15,300	146,281,000	40.0
	UNOCAL	● Attaka, 1970	7,500	71	81	48,051	415,942,873	39.0
		● Melahin, 1972	7,500	6	6	790	5,892,312	23.1
		● Kerindingan, 1972	7,000	4	8	353	5,031,150	23.8
		● Sepinggan, 1973	11,150	13	17	6,224	39,437,356	34.0
		● Yakin, 1976	5,100	24	28	11,788	15,027,171	18.8
		● Rajah, 1981	5,500	3	3	1,870	2,984,559	33.8
	CONOCO GROUP	● Udang, 1974	5,595	22	28	9,098	52,164,000	40.0
		● Kepeting, 1982	6,000	2	2	657	156,000	37.0
	MOBIL OIL	Arun, 1971	10,050	34	50	102,140	253,176,562	55.0
	TESORO INDONESIA PETROLEUM	Samboja, 1909	360- 4,380	27	126	557	64,209,830	21.0
		Sanga Sanga, 1897	275- 6,000	109	239	3,329	265,558,113	32.0
		Tarakan, 1906	200- 6,540	131	1,165	1,855	209,519,669	20.0
	MARATHON	● Kakap KH, 1980	8,500	11	12	9,449	3,449,000	45.0
		Total Indonesia		**5,774**	**10,084**	**1,256,800**	**11,897,172,004**	
IRAN(e)	**NIOC**	Agha Jari, 1936	7,440	58	89	1,848,000	35,009,515,000	34.0
		Ahwaz Asmari, 1958	8,150	73	85			32.0
		Ahwaz Bangestan, 1958	12,000	...	7			24.3
		Bibi Hakimeh, 1961	4,570	19	33			29.9
		Binak, 1959	10,440	...	4			29.9
		Chillingar, 1974	3,350	...	1			39.3
		Chesmeh Khush, 1967	10,700	...	4			27.7
		Dehluran, 1972	11,900	...	6			31.0
		Gachsaran, 1937	3,400	46	62			31.0
		Haft Kel, 1927	1,980	2	11			37.7
		Karanj, 1963	5,360	7	7			33.9
		Kharg, 1961	10,900	...	...			31.6
		Kupal, 1965	10,500	...	7			32.8
		Lab-e Safid, 1968	4,350	...	7			35.3
		Mansuri, 1963	7,100	4	8			28.4
		Marun, 1963	9,400	55	112			32.6
		Masjid-e Suleiman, 1908	1,600	7	24			39.3
		Naft Safid, 1938	5,000	5	19			36.8
		Paris, 1964	4,670	22	27			38.8
		Par-e Siah, 1964	4,250	...	1			37.7
		Pazanan, 1961	7,250	44	71			37.2
		Rag-e Safid, 1964	7,230	19	29			28.6
		Ramin, 1966	12,200	...	...			32.9
		Ramshir, 1962	8,750	...	3			27.6
		Sulabedar, 1971	3,400	...	1			30.4
		Naft-e Shah, 1923	2,000- 3,000	...	...			43.0
		● Bahregansar, 1960	9,000	...	...			30.0
		● Hendijan, 1968	11,000	...	...			23.0
		● Nowruz, 1966	8,200	...	...			21.0
		● Rakhsh, 1969	7,650	...	...			35.8
		● Rostam, 1966	7,000	...	...			34.4
		● Ardeshir, 1969	2,800	...	...			27.0
		● Cyrus, 1962	7,000	...	...			18.3
		● Darius, 1961	11,000	...	...			34.0
		● Fereidoon, 1966	7,000	...	...			28.5
		● Sassan, 1965	7,500- 8,100	...	...			34.0
		Total Iran		**361**	**618**	**1,848,000**	**35,009,515,000**	
IRAQ(e)	**INOC**	Ain Zalah, 1939	5,200- 6,500	8	28	1,690,000	18,137,044,000	31.0
		Bai Hassan, 1953	4,800- 5,400	62	77			34.0
		Butmah, 1953	3,900	7	17			31.0
		Hamrin, 1973	2,000	...	...			...
		Jambur, 1954	5,500-12,500	36	52			38.0
		Kirkuk, 1927	2,800- 4,200	59	226			36.0
		Naft Khaneh, 1909	3,500	...	...			42.5
		Rumaila North, 1958	10,300	205	324			33.0
		Rumaila South, 1953	10,200	117	192			34.0
		Zubair, 1949	10,200	48	84			35.0
		Abu Ghurab, 1971	9,300	...	...			24.0
		Buzurgan, 1970	12,000	19	22			24.0
		Jabal Fauqui, 1974	10,000	...	...			25.5
		Luhais, 1961	8,200	16	20			33.0
		Walyanah, 1929	650	38	87			16.0
		East Baghad, 1975	6,000- 7,000	...	...			16.0
		Total Iraq		**615**	**1,129**	**1,690,000**	**18,137,044,000**	

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
ISRAEL(e)	LAPIDOTH	[illegible]tz-Brur, 1955	5,200	4	4			29.2
		K[illegible]nav, 1962	5,500	2	2			27.9
	OEIL	Ashdod, 1976	8,400	2	2	1,000	20,545,400	32.5
	EMOG	Gurim, 1984	3,280	1	1			17.0
		Total Israel		**9**	**9**	**1,000**	**20,545,400**	
ITALY	AGIP(e)	Cavone, 1979	10,663-18,068	16	20			24.0
		Malossa, 1973	17,881-21,231	4	10			55.0
		Pisticci-S. Cataldo, 1960	6,820- 6,880	11	14			11.4
		Gela, 1956	11,280-11,350	63	72			10.0
		Perla	7,850	8	8			13.3
		Cela Mare	10,300	11	18			10.0
		Ragusa, 1954	5,760	60	70	39,600	311,030,400	...
		Nilde, 1977	4,545	1	2			38.9
		S. Maria	...	6	6			15.9
		Emilio S	9,215	1	1			13.0
		Narciso	2,650	1	1			21.1
		Varius	...	18	56			...
		Other	...	16	65			2.8-55.9
	ELF	● Santa Maria a Mare, 1974	7,900	10	10	1,600		23.0
		● Rospo Mare, 1975	4,600	9	9	2,500	21,717,300	11.0
		● Sarago Mare, 1979	5,200	4	4	5,300		8.0
		Total Italy		**239**	**366**	**49,000**	**332,747,700**	
IVORY COAST	ESSO COTE D'IVOIRE	● Belier, 1975	6,500	8	12	3,343	15,520,000	...
	PHILLIPS-AGIP-SEDCO-PETROCI	● Espoir, 1980	6,500-11,000	6	8	14,024	23,710,765	32.3
		Total Ivory Coast		**14**	**20**	**17,367**	**39,230,765**	
JAPAN	JAPEX	● Aga-Oki, 1972	7,590	7	7	1,308	5,013,732	24.8
		Higashi-Niigata, 1965	4,500- 9,200	18	28	1,055	8,263,888	53.9
		Sarukawa, 1958	2,000- 3,200	62	134	1,302	16,053,540	32.3
		Yoshii, 1968	8,000	9	25	721	8,419,179	61.8
		Yurihara, 1976	1,310- 7,610	9	14	277	187,192	43.5
		Katakai, 1960	3,310-16,300	5	16	264	293,782	50.0
		Other	...	56	77	531	21,966,231	...
	IDEMITSU OIL DEVELOPMENT CO. LTD.	● Agaoki-Kita, 1982	4,950	10	10	3,989	2,391,824	33.0
	TEIKOKU OIL	Yabase, 1933	1,100- 5,800	61	73	342	32,914,927	33.0
		Minami-Aga, 1964	7,300- 9,600	10	26	511	13,463,289	38.5
		Minami-Nagaoka, 1984	13,200-15,100	5	11	620	516,443	55.7
		Hagashi-Kashiwazaki, 1970	6,000- 8,900	6	13	570	7,726,366	62.0
		Kubiki, 1959	1,100- 6,400	94	125	658	12,718,584	29.7
		Other	...	35	47	173	5,241,383	...
		Total Japan		**387**	**906**	**12,321**	**135,170,380**	
JORDAN(e)	NRA	Hamzah, 1984	...	...	...	4,000	1,460,000	30.0
		Total Jordan		...	...	**4,000**	**1,460,000**	
KUWAIT(e)	KOC	Burgan, 1938	4,800	210	393			30.8
		Ahmadi, 1952	4,800	11	84			31.7
		Magwa, 1951	4,800	71	113			33.0
		Raudhatain, 1955	8,600	41	53			34.4
		Bahra, 1956	8,500	...	2	1,244,000	22,240,468,000	...
		Sabriya, 1957	8,300	9	44			36.3
		Minagish, 1959	10,000	1	21			34.4
		Umm Gudair, 1962	9,000	20	33			26.9
		Total Kuwait		**363**	**743**	**1,244,000**	**22,240,468,000**	
LIBYA(e)	AGIP	Bu Attifel, 1968	14,300	25	33			41.0
		Rimal-Katib, 1965	14,000	2	6			35.0
	ELF	El Meheiriga	10,500	2	2			46.0
	LNOC	Arshad, 1966	10,100					42.0
		Jebel, 1962	8,100					38.0
		Majid, 1968	9,000- 9,800					...
		Don Mansour Unit	5,600					...
		Nasser, 1959	5,500- 7,600					38.0
		Lehib-Dor Marada Unit, 1965	9,500					50.0
		Ragubа, 1961	5,400					43.0
		Beda, 1959	4,000					36.0
		Bualawn, 1972	6,000					40.0
		Dor, 1967	6,400					33.2

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
		Kotla, 1963	5,500	491	491	1,031,000	15,730,475,000	34.0
		Sahabi B & D, 1961	9,000-10,000					39.0
		Sarir, 1961	9,000					37.2
		Amal, 1959	9,900					37.5
		Ora, 1962	7,250					40.2
		Ghani, 1978	6,000					40.0
		Bahi, 1968	3,500- 3,750					43.4
		Belhedan, 1962	7,000					33.6
		Dahra, 1959	3,100- 3,700					37.0-41.0
		Defa, 1969	5,400- 5,900					35.6
		Gialo, 1961	2,200- 6,300					35.7
		Harsh, 1978	7,400					34.6
		Khalifa, 1978	5,400- 7,000					34.6
		Masrab, 1978	10,000					39.6
		Samah, 1961	9,000					33.4
		Waha, 1960	6,000					36.0
		Zaggut, 1962	6,000					36.4
		Balat, 1983	5,100- 5,400					32.2
		Ali, 1975	3,900	1	2			50.0
		Almas, 1975	4,000	5	8			49.5
		Intisar A, 1967	9,750	8	19			45.0
		Intisar B, 1974	9,600	2	2			50.0
		Intisar C, 1967	9,650	1	6			37.5
		Intisar D, 1967	9,400	19	27			39.0
		Intisar E, 1968	5,300- 7,100	8	11			34.7
		Nafoora-Augila, 1966	2,200-10,000	13	55			35.5
		Aswad, 1978	6,250	8	8			46.0
		Sabah, 1977	5,500	36	38			42.0
		Zella, 1977	6,750	27	31			48.1
		Other	7,900- 8,900	1	2			40.4
		Fidaa, 1979	7,000	9	9			41.7
		Hakim, 1978	6,700	3	3			48.5
		Total Libya		**681**	**753**	**1,031,000**	**15,730,475,000**	
MALAYSIA	ESSO MALAYSIA	• Bekok, 1976	5,500	23	30	24,600	91,000,000	47.0
		• Pulai, 1973	4,300	23	32	16,400	83,000,000	42.3
		• Tapis, 1975	6,700	70	106	45,500	201,000,000	45.0
		• Kepong, 1979	6,000	3	10	4,100	9,000,000	47.0
		• Tiong, 1978	5,800	28	42	55,300	102,000,000	47.0
		• Tinggi, 1980	4,400	26	31	32,300	63,000,000	48.0
		• Irong Barat, 1979	3,300	10	12	18,300	32,000,000	35.0
		• Semangkok, 1980	3,700	5	5	38,100	53,000,000	42.5
		• Guntong, 1978	...	9	14	15,890	17,000,000	...
		• Palas, 1979	...	11	11	4,400	4,000,000	...
		• Tabu, 1978	...	9	13	6,600	7,000,000	...
	SARAWAK SHELL BHD.	• Baronia, 1967	7,900	20	40	16,300	143,249,000	42.0
		• Bayan, 1976	4,200	7	7	19,120	16,679,000	35.0
		• Betty, 1967	7,900	10	14	20,320	57,117,000	38.0
		• Bokor, 1972	2,000	18	19	26,210	25,167,000	35.0
		• Siwa, 1973	4,100	3	4	2,250	1,021,000	25.0
		• Temana, 1972	3,100	17	27	12,120	33,324,000	35.0
		• Tukau, 1966	5,000	26	44	23,290	83,501,000	29.2
		• D18, 1981	4,000	5	5	140	51,000	35.0
	SABAH SHELL	• Barton, 1971	2,400	4	8	4,110	7,900,000	37.0
		• Erb West, 1977	6,785	12	15	7,220	19,235,000	30.0
		• Ketam, 1977	4,800	3	4	1,830	668,000	33.0
		• Samarang, 1972	5,700	46	66	51,020	215,922,000	37.0
		• South Furious, 1974	3,300	8	15	4,860	11,174,000	30.0
		• St. Joseph, 1975	2,200	11	12	[illegible]	14,284,000	32.0
	SARAWAK SHELL BHD.	• Baram, 1964	9,500	12	36	12,520	133,170,000	36.0
	PETRONAS CARIGALI SDN. BHD.	• Bakau, 1971	11,000	2	3	250	6,991,000	39.5
		• Fairley Baram, 1973	8,655	...	2	...	5,846,000	39.5
		• West Lutong, 1966	5,600	12	27	8,200	117,993,000	39.5
	PETRONAS CARIGALI SDN. BHD.	• Tembungo, 1971	6,000	8	16	3,300	27,400,000	40.0
		Total Malaysia		**441**	**670**	**485,740**	**1,582,892,000**	
MEXICO(e)	NORTH ZONE, N.E.	Misión, 1945	5,440	3	3			...
		Monterrey, 1950	6,510	5	6			...
		Tigrillo, 1971	3,342	...	11			...
		Other	...	11	77			...
	NORTH ZONE, N.	• Arenque, 1970	11,362	17	17			26.0
		Constituciones, 1956	6,350	176	176			17.0
		Ebano-Pánuco, 1901	1,450	324	324			12.0
		Tamaulipas	4,200	152	152			19.0
		Other	...	...	...			...
	NORTH ZONE, S.	Chicontepec, 1973	4,264	220	220			34.1
		• Isla de Lobos, 1963	6,875	9	9			40.0

	Name of field, discovery date	Depth, ft	No. of wells Producing	No. of wells Total	Production 1986 average B/d	Production Cumulative to Dec. 31, 1986 Bbl	°API gravity
	• Marsopa, 1974	10,198	7	7			39.0
	Naranjos-C. Azul, 1909	1,800	206	206			22.0
	Tres Hermanos, 1959	6,960	34	34			21.0
	Other	...	...	...			...
CENTRAL ZONE, POZA RICA	• Atún, 1966	9,040	7	7			37.0
	• Bagre, 1973	10,919	8	8			33.0
	Escolín, 1942	7,216	95	95			26.3
	Hallazgo, 1955	10,170	36	36			25.0
	Jiliapa, 1958	7,390	29	29			24.0
	Mecatepec, 1941	7,544	32	32			29.5
	Miquetla, 1959	6,480	57	57			35.0
	Poza Rica, 1930	7,090	132	132			35.0
	Pres. Alemán, 1949	8,036	86	86			26.0
	Remolino, 1962	10,745	36	36			29.5
	San Andrés, 1956	10,410	123	123			29.0
	Other	...	315	316			...
CENTRAL ZONE, CUENCA DEL PAPALOAPAN	Matapionche, 1974	11,129	29	45			35.6
	Other	...	22	31			...
SOUTHERN ZONE, NANCHITAL	Ixhuatlán Ote., 1965	1,960	20	34			22.6
	Moloacán, 1962	500	170	207			22.3
	Santa Rosa, 1952	1,312	6	9			25.4
CENTRAL ZONE, N. FAJA DE ORO	Acuatempa, 1955	4,085	6	6			21.0
	Muro, 1965	3,966	11	19			17.0
	Ordónez, 1952	5,220	8	8			21.0
	Ocotepec, 1953	3,737	13	13			20.0
	Santa Agueda, 1953	4,780	3	3			16.0
	Other	...	57	57			...
SOUTHERN ZONE, EL PLAN	Agata, 1956	3,830	9	15			...
	Bacal, 1976	3,500	24	40			35.0
	Concepción, 1974	1,600	3	15			31.0
	Cuichapa, 1935	2,200	63	123			30.0
	El Plan, 1931	1,700	67	86			30.0
	Lacamango, 1973	1,700	18	27			26.3
	Los Soldados, 1953	4,492	18	22			32.0
	Other	...	26	38			...
SOUTHERN ZONE, AGUA DULCE	Blasillo, 1967	7,216	31	58	2,427,650	13,748,979,200	40.0
	Cinco Presidentes, 1960	6,862	73	134			35.0
	Burro, 1931	2,200	23	38			26.0
	Venta, 1954	4,730	20	83			41.0
	Ogarrio, 1957	5,790	57	194			38.0
	Otates, 1965	7,469	12	18			39.0
	Rodador, 1971	11,398	14	14			26.0
	Sánchez Magallanes, 1957	4,240	73	345			27.0
	San Ramón, 1967	9,517	29	65			30.0
	Tonalá, 1928	1,770	31	61			28.0
	Other	...	3	15			...
SOUTHERN ZONE, COMALCALCO	Agave, 1977	13,450	7	16			41.7
	Arroyo Zanapa, 1978	14,599	1	2			38.9
	Arteza, 1977	11,800	3	5			26.4
	Ayapa, 1972	8,200	3	5			7.2
	Cacho López, 1977	14,250	1	1			29.0
	Cáctus, 1972	14,100	14	30			31.5
	Carrizo, 1962	3,500	18	35			23.3
	Castarrical, 1967	10,080	38	59			29.3
	Comoapa, 1979	14,432	4	6			44.5
	Copano, 1977	11,890	9	10			43.9
	Cunduacán, 1974	13,775	12	42			28.9
	El Golpe, 1963	3,500	93	135			25.7
	Giraldas, 1977	15,225	21	22			37.0
	Iride, 1974	13,775	12	16			28.5
	Muspac, 1982	9,676	1	13			57.0
	Mecoacán, 1957	2,200	17	30			8.6
	Mora, 1981	...	61	63			38.1
	Mundo Nuevo, 1977	11,800	4	5			46.0
	Níspero, 1974	14,100	4	18			34.4
	Paredón, 1978	15,690	12	13			39.8
	Oxiacaque	11,150	5	21			29.1
	Platanal, 1978	15,900	...	...			30.2
	Río Nuevo, 1975	14,950	5	5			34.8
	Samaria (Cret), 1973	14,209	26	49			31.0
	Santuario, 1966	9,617	28	37			37.0
	Sitio Grande, 1972	13,766	19	22			35.0
	Sunuapa, 1978	12,887	2	7			32.8
	Tapijualpa, 1982	15,613	1	12			39.8
	Tintal, 1968	5,904	4	6			22.0
	Topén, 1978	11,172	2	3			25.4
	Tupilco, 1959	9,685	67	101			27.0
	Bellota, 1982	17,056	9	12			41.0

		Name of field, discovery date	Depth, ft	No. of wells		Production		°API gravity
				Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	
		Cardenas, 1979	17,548	26	45			38.0
		Chiapas, 1979	12,136	5	7			42.0
		Fenix, 1979	17,876	4	7			40.0
		Iris, 1979	14,432	8	8			39.2
		Jujo, 1980	17,548	18	19			32.0
		Caparroso, 1982	18,368	1	1			41.2
		Tecominoacan, 1983	19,519	1	5			37.5
		Jolote, 1983	18,119	1	1			39.4
		Artesa Terc., 1984	...	2	3			28.0
		Carmito, 1980	10,050	1	1			45.6
		Edén, 1983	17,590	1	2			38.5
		Samaria Terc., 1965	4,920	16	23			13.9
		Other	...	16	37			...
	GULF OF CAMPECHE	• Cantarell, 1976	8,528	63	75			21.3
		• Abkatun, 1978	11,800	25	35			30.0
		• Ku, 1979	10,000	8	15			22.0
		• Pol, 1979	12,600	8	8			35.0
		• Chuc, 1982	13,100	1	3			35.0
		• Ixtoc, 1984	...	1	2			35.0
		Total México		**3,788**	**5,120**	**2,427,850**	**13,748,979,200**	
MOROCCO(e)		Sidi Rhalem, 1962	6,265- 7,185	4	4	370	16,011,700	...
		Rharb, 1951	4,590					...
		Total Morocco		**4**	**4**	**370**	**16,011,700**	
NETHERLANDS	UNOCAL	• Helm, 1979	4,400	7	8	3,139	6,124,136	17.9
		• Helder, 1980	4,800	12	13	6,994	13,683,383	21.6
		• Hoorn, 1981	5,000	7	7	9,074	15,095,020	25.8
	NAM	DeLier, 1955	5,200	22	33	491	16,561,600	34.8
		Rotterdam, 1984	...	2	2	1,032	585,000	32.0
		Berkel, 1954	...	17	17	3,132	3,855,800	20.0
		Ysselm, 1956	5,200	59	86	3,881	87,198,300	22.0
		Pynacker, 1955	...	4	5	491	5,780,500	22.0
		Wassenaar, 1956	4,200	28	41	1,975	45,828,900	18.7
		Zoetermeer, 1957	3,200	30	30	572	9,573,400	16.5
		Schoonebeek, 1944	2,500	265	356	11,353	228,459,100	35.6
		Other	...	70	91	70	626,000	...
	CONOCO	Kotter, 1980	6,500	8	10	21,076	17,733	33.0
		Logger, 1982	6,500	7	8	9,929	4,212	33.5
	AMOCO	• Rijn, 1982	6,600	12	25	15,880	5,930,000	35.0
		Total Netherlands		**550**	**732**	**89,089**	**439,323,084**	
NEUTRAL ZONE	AOC	• Khafji, 1961	4,400-10,300	109	126			28.2
		• Hout, 1969	5,300-10,500	48	68			33.0
	CHEVRON & KOC	Wafra, 1953	1,100- 7,000	312	392	343,000	4,162,893,000	18.9-23.5
		S. Fuwaris, 1963	6,300	6	9			25.0
		S. Umm Gudair, 1966	8,900	10	18			24.3
		Total Neutral Zone		**481**	**613**	**343,000**	**4,162,893,000**	
NEW ZEALAND	SHELL-BP-TODD	• Kapuni, 1959	11,700	9	12	6,469	40,856,247	54.0
	MAUI DEVELOPMENT	• Maui, 1969	11,000	11	14	14,286	20,146,970	58.0
	PCNZ	McKee, 1981	7,848- 8,251	17	19	8,659	6,887,988	38.5
		Kaimiro, 1982	11,900	1	1	74	62,692	46.4
		Total New Zealand		**38**	**46**	**29,488**	**67,953,897**	
NIGERIA	AGIP-PHILLIPS	Akri, 1977	9,600-10,600	6	11	8,465	59,065,599	41.8
		Akri West, 1975	9,900-10,200	...	2	...	482,258	31.4
		Ashaka, 1968	9,700-12,000	1	1	429	2,128,652	36.7
		Beniku, 1974	12,000	1	2	360	3,309,326	29.5
		Ebegoro, 1976	11,500-12,000	7	9	8,885	56,328,995	35.7
		Ebocha, 1965	8,000-10,900	10	16	7,794	105,779,769	36.2
		Idu, 1973	7,750-10,700	...	10	...	23,862,581	28.0
		Kwale, 1968	10,000-11,500	3	4	1,154	3,095,572	41.5
		M'Bede, 1966	7,300- 9,400	11	14	14,984	152,227,985	41.6
		Obama, 1975	11,600-14,300	11	8	17,643	86,517,279	40.8
		Obiafu, 1973	9,300-12,200	13	17	11,991	75,575,425	43.9
		Obrikom, 1973	8,000-10,000	7	12	6,173	52,019,234	41.5
		Odugri, 1972	12,500	1	2	730	9,434,454	40.2
		Ogbogene, 1976	10,000	...	2	...	3,302,763	37.0
		Ogbogene W., 1981	13,000	...	1	...	353,135	56.2
		Okpai, 1968	10,000-12,000	8	8	3,832	16,139,904	44.3
		Omoku W., 1975	11,500	1	1	634	4,716,282	27.4

			No. of wells		Production		
	Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
	Oshi, 1974	9,600-11,300	15	11	10,529	59,744,703	37.7
	Tebidaba, 1975	10,300-13,300	13	10	19,277	105,788,553	34.7
	Umuoru, 1975	14,100	3	4	1,974	3,698,886	42.2
	Agwe, 1977	10,800	...	1	...	1,998,132	47.9
	Clough Creek, 1977	10,000-12,400	11	9	9,519	16,890,585	35.6
	Beniboye N.	9,000-10,000	9	9	8,513	5,233,810	33.9
	Taylor Creek, 1985	13,724	...	...	...	...	...
PHILLIPS	Gilli-Gilli, 1967	7,600-14,000	2	2	1,036	2,956,448	46.7
CHEVRON	Abiteye, 1970	5,750- 9,400	12	19	10,264	59,300,936	39.7
	• Delta, 1965	5,600- 9,500	22	27	18,889	157,813,222	37.3
	• Delta South, 1965	7,100-10,179	18	27	25,807	26,336,514	38.4
	• Isan, 1970	5,900- 9,000	4	11	2,307	41,381,423	40.4
	Makaraba	7,100-12,005	12	26	23,811	78,212,263	27.7
	• Malu, 1969	4,800- 6,300	12	18	16,864	91,734,394	40.4
	• Mefa, 1965	8,570-12,030	4	5	5,516	15,533,842	38.1
	• Meji, 1965	5,200-10,900	19	22	17,723	139,025,576	31.9
	• Meren, 1965	5,000- 7,500	28	51	59,359	453,033,041	31.9
	• Okan, 1964	5,500- 9,245	36	67	37,026	416,770,100	38.1
	• Parabe/Eko, 1968	4,500- 8,200	11	23	6,702	96,307,197	40.4
	Utonana, 1971	7,400- 9,165	2	5	640	7,660,783	20.4
	• W. Isan, 1971	7,825-10,229	4	9	3,028	33,221,198	40.4
	Yorla South, 1974	11,389-12,635	...	2	...	834,040	41.0
	Jisike, 1975	6,300- 7,600	3	4	2,261	5,138,087	41.1
	Robertkiri, 1964	11,484-13,190	5	12	5,398	5,280,977	40.2
	• Tapa, 1978	8,150-10,842	10	10	11,527	243,737,794	39.5
ASHLAND	Izombe-Ossu, 1974	9,500	15	15	12,409	46,855,328	41.0
	• Akam, 1980	6,700	9	9	9,331	11,651,481	35.2
	• Adanga, 1980	5,600- 7,300	8	8	15,739	5,804,731	35.0
ELF	Aghigo, 1972	...	15	22	3,815	21,313,918	24.8
	Okpoko, 1967	...	10	24	10,203	26,873,488	24.8
	Obodo-Jatumi, 1966	...	22	25	11,251	56,679,802	24.8
	Upamini, 1965	...	11	18	2,443	14,178,237	24.8
	Obagi, 1964	...	70	77	54,576	334,488,915	24.6
	Erema, 1972	...	4	5	3,851	7,863,600	24.6
MOBIL	• Adua, 1967	6,970	4	5	8,493	40,238,557	30.3
	• Asabo, 1966	5,600	8	14	14,747	151,393,607	32.4
	• Ekpe, 1966	8,200	5	17	15,867	182,909,275	30.3
	• Ekpe-WW, 1977	6,810	6	6	9,913	30,203,047	30.3
	• Eku, 1966	5,420	1	6	1,608	14,861,191	30.8
	• Enang, 1968	6,600	18	23	18,531	113,277,609	35.1
	• Etim, 1968	6,200	7	9	18,594	99,114,888	32.9
	• Idoho, 1966	9,020	3	4	2,030	27,976,695	30.8
	• Inim, 1966	5,850	8	10	17,726	133,519,784	37.8
	• Mfem, 1967	5,200	3	3	4,339	22,653,656	36.1
	• Ubit, 1968	5,400	30	45	27,197	168,257,669	36.1
	• Unam, 1968	5,180	6	9	6,733	38,167,314	33.5
	• Utue, 1966	5,700	4	7	7,536	64,123,484	36.8
	• Isobo, 1968	7,345	3	4	2,037	6,357,841	30.8
	• Iyak	...	6	6	23,718	26,341,070	38.7
	• Asabo 'D'	...	1	2	1,327	1,373,470	35.0
	• Ata	...	...	...	...	433	...
	• Oso	...	...	...	...	8,421	...
	• Usari	...	...	...	...	5,885	...
INPEX	Ogharefe, 1973	9,900	8	11	5,455	26,387,218	47.4
SHELL (MIDWEST)	Ugh-Ogini, 1964	5,860	5	18	2,491	20,050,706	19.0
	Ugh-Uzere-East, 1960	8,500	8	14	3,972	84,448,451	23.0
	Ugh-Uzere-West, 1964	8,500	5	11	3,035	98,300,602	23.0
	Ugh-Olomoro, 1963	7,000-10,000	14	33	15,258	269,882,416	22.0
	Ugh-Oweh, 1964	12,300	4	11	2,331	91,616,216	28.0
	Ugh-Kokori, 1960	8,000- 9,800	17	27	13,809	304,530,524	42.0
	Ugh-Afiesere, 1966	8,000- 9,000	20	33	9,711	111,236,709	22.0
	Ugh-Eriemu, 1961	12,500	14	16	5,539	39,559,309	26.0
	Ugh-Ughelli-East, 1959	11,800	5	11	2,673	87,679,532	35.0
	Ugh-Ughelli-West, 1963	7,400-10,200	5	10	2,880	30,963,842	21.0
	Ugh-Utorogu, 1964	9,000	8	19	6,134	127,088,672	25.0
	Ugh-Oroni, 1964	12,000	1	7	583	25,514,529	22.0
	Ugh-Warri-River, 1961	12,264	1	3	990	14,521,505	31.0
	Ugh-Evwreni, 1962	10,900	5	11	2,805	34,380,013	38.0
	Ugh-Isoko, 1960	...	1	2	819	5,660,976	19.0
	Forc-Odidi, 1967	10,980	14	25	17,480	196,223,250	37.0
	Forc-Opukushi, 1963	7,823	4	15	16,307	104,736,336	29.0
	Forc-Jones Creek, 1967	7,000- 9,000	14	34	23,215	376,852,060	29.0
	Forc-Opuama, 1973	...	2	5	1,901	23,688,355	41.0
	Forc-Egwa, 1967	9,350	10	24	8,340	126,445,444	37.0
	Forc-Forcados/Yokri, 1968	10,859	46	89	62,553	504,060,435	22.0
	Forc-Batan, 1968	11,000	2	9	1,169	53,363,918	27.0
	Forc-Escravos Beach, 1969	8,176	5	13	5,827	54,288,857	36.0
	Forc-Otumara, 1969	8,176	8	26	16,390	142,482,907	25.0

		Name of field, discovery date	Depth, ft	No. of wells Producing	No. of wells Total	Production 1986 average B/d	Production Cumulative to Dec. 31, 1986 Bbl	°API gravity
		Forc-Saghara, 1970	8,590	1	6	1,494	29,475,360	31.0
		Forc-Ajuju, 1970	13,324	...	2	128	9,443,072	27.0
		Forc-Benisede, 1973	...	6	21	14,613	91,631,474	23.0
		Node-Sapele, 1970	12,788	10	19	13,729	101,991,778	42.0
		Node-Oben, 1972	12,036	17	20	28,585	108,918,962	40.0
		Forc-Opukushi N., 1977	...	1	2	447	2,245,933	30.0
		Abura	...	1	3	3,304	15,204,769	44.8
		Rapele	...	1	3	1,499	22,052,181	44.4
		Amukpe	...	1	2	978	11,211,014	38.9
		Osioka	...	...	2	168	6,807,890	...
	SHELL (EAST)	Phl-Bomu, 1958	6,500- 7,500	14	38	11,439	347,257,106	36.0
		Phl-Imo River, 1959	5,800-10,000	29	45	33,564	445,753,287	32.0
		Phl-Nkali, 1963	12,000	1	10	25	27,186,884	42.0
		Phl-Elelenwa, 1959	11,000	3	11	2,011	29,671,024	39.0
		Phl-Umuechem, 1969	5,800-10,700	8	18	6,646	145,124,471	36.0
		Phl-Apara, 1960	9,000	5	7	4,404	23,171,605	36.0
		Phl-Bodo-West, 1959	9,700	7	11	6,678	76,098,573	29.0
		Phl-Afam, 1956	6,000	9	15	4,035	57,269,591	45.0
		Phl-Yorla, 1970	11,917	7	13	4,704	57,022,633	44.0
		Phs-Bonny, 1959	12,254	7	17	6,526	85,206,972	36.0
		Phs-Cawthorne Channel, 1963	11,000	16	28	44,096	252,045,390	38.0
		Phs-Ekulama, 1958	10,483	17	29	32,140	178,116,398	32.0
		Phs-Soku, 1958	11,500	12	21	10,481	103,207,438	31.0
		Phs-Orubiri, 1971	...	2	6	4,008	14,768,373	38.0
		Egb-Oguta, 1965	10,300	9	24	9,738	126,067,988	46.0
		Eade-Utapate South, 1974	...	5	11	6,940	32,946,680	44.0
		Eade-Opobo South, 1974	...	4	6	6,889	14,183,795	44.0
		Ibigwe	...	...	2	...	...	...
		Korokoro	...	6	8	4,121	18,137,585	34.3
		Otamini	...	4	5	2,100	13,033,548	21.8
		Ugada	...	1	1	69	994,393	...
		Ahia	...	7	13	4,383	81,988,746	38.2
		Akpor	...	1	3	138	1,795,146	27.5
		Alakiri	...	5	15	4,331	60,674,129	38.2
		Assa	...	...	2	...	...	20.7
		Egbema West	...	5	17	6,185	75,057,068	42.2
		Ebubu	...	3	8	218	18,606,369	22.2
		Egbema	...	6	7	5,800	49,619,583	35.5
		Cesw-Nun River, 1960	...	3	6	3,406	29,703,607	39.0
		Cesw-Etelebou, 1971	12,000	5	9	11,011	114,374,821	33.0
		Cesw-Kolo Creek, 1960	12,000	11	25	18,508	115,956,605	42.0
		Cesw-Diebu Creek, 1966	...	10	12	12,176	98,597,774	43.0
		Phl-Isimiri, 1964	5,900-11,000	3	6	1,798	36,562,113	28.8
		Phl-Onne, 1965	10,384	3	3	872	8,680,261	29.0
		Phl-Obigbo-North, 1963	6,500-10,000	25	41	14,884	165,400,569	22.0
		Phl-Ajokpori, 1967	...	2	2	973	4,800,196	29.0
		Phl-Agbada, 1960	8,000-12,000	22	45	19,233	165,277,346	32.1
		Phl-Akuba, 1967	...	1	1	356	3,949,170	29.0
		Cesw-Adibawa, 1967	11,950	5	23	8,501	66,782,991	26.0
		Cesw-Adibawa NE, 1973	...	1	3	2,270	12,501,251	26.0
		Cesw-Ubie, 1961	14,380	2	5	4,373	28,638,766	28.0
		Phl-Obeakpu, 1975	...	2	4	3,504	14,602,796	45.0
		Cosw-Nembe Creek, 1973	...	28	36	79,796	171,472,502	35.0
		Phs-Akaso, 1979	...	1	1	1,540	2,327,374	30.0
		Bugama Creek	...	1	6	226	12,654,206	43.0
		Kalaekule	...	2	5	1,227	447,856	39.6
		Krakama	...	1	10	632	16,737,788	23.8
		Odeama Creek	...	3	4	13,035	9,987,094	33.3
		Tai	...	2	2	573	4,471,587	37.4
	TEXACO-CHEVRON	• Pennington, 1965	5,000-10,400	2	3	2,429	23,654,492	38.2
		• Middleton, 1972	5,000- 7,000	4	5	3,105	13,952,875	36.6
		• North Apoi, 1973	4,000- 8,100	23	36	36,023	139,244,734	35.8
		• Funiwa, 1978	5,000- 7,000	21	32	23,395	27,703,650	38.2
		• Sengana, 1967	...	1	1	357	663,682	46.7
		Total Nigeria		**1,253**	**2,151**	**1,467,542**	**11,344,561,207**	
NORWAY	**PHILLIPS**	• Ekofisk, 1968	10,000	35	38	96,351	880,285,101	41.1
		• West Ekofisk, 1970	10,300	11	11	9,819	80,398,850	43.9
		• Cod, 1968	9,500	6	6	3,440	19,017,140	55.0
		• Tor, 1970	10,000	8	13	12,684	111,014,589	38.0
		• Albuskjell, 1972	10,400	15	15	7,330	48,808,008	45.0
		• Edda, 1972	10,480-10,600	7	7	2,580	22,572,304	41.5
		• Eldfisk, 1970	9,350-10,000	32	32	62,000	201,700,311	37.6
	MOBIL	• Statfjord, 1974	7,700	51	82	*591,033	*802,512,696	39.0
	AMOCO	• Valhall, 1972	8,200	20	20	43,500	57,980,000	35.0
	CONOCO	• Murchison, 1975	9,900	14	14	*18,217	*50,525,750	38.0
		• Ula, 1976	11,000	3	3	14,509	5,310,000	39.0
		Total Norway		**202**	**241**	**861,463**	**2,280,124,749**	

*Norway's production share.

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
OMAN	**PDO**	Lekhwair, 1968	4,352	31	47	18,000	50,698,000	37.8
		Natih, 1963	4,788	33	61	27,000	333,517,000	31.0
		Shibkah, 1976	2,591	2	2	...	655,000	31.0
		Fahud, 1964	2,499	128	203	69,000	726,964,000	32.7
		Yibal, 1962	8,465	151	153	148,000	560,519,000	40.2
		Al Huwaisah, 1969	5,320	36	38	18,000	159,389,000	37.0
		Burhaan, 1984	4,011	1	2	1,000	1,100.000	36.7
		Ghaba North, 1972	2,227	12	16	12,000	45,638,000	35.8
		Saih Nihaydah, 1972	8,700	13	18	28,000	135,813,000	39.0
		Saih Rawl, 1973	9,826	15	16	10,000	83,928,000	41.1
		Qarn Alam, 1972	1,354	4	6	2,000	18,599.000	14.8
		Habur, 1975	5,800	1	2	...	4,277,000	14.8
		Mahjour, 1979	11,700	1	3	1,000	1,845,000	37.2
		Al Ghubar, 1974	1,916	4	4	4,000	2,879,000	23.5
		Barik, 1974	8,856	3	3	2,000	717,000	42.1
		Anzauz, 1984	7,098	3	3	5,000	3,078,000	47.8
		Hasirah, 1984	8,708	...	3	...	245,000	48.8
		Zauliyah, 1981	8,177	6	9	8,000	8,276,000	45.2
		Wafra, 1983	5,510	5	5	1,000	617,000	40.6
		Suwaihat, 1982	6,452	5	5	8,000	4,881,000	36.0
		Bahja, 1984	5,697	6	6	4,000	2,561,000	44.5
		Fayyadh, 1983	3,608	1	1	...	125,000	27.0
		Sayyala, 1981	3,690	11	11	27,000	11,182,000	49.7
		Zareef, 1985	3,264	3	3	1,000	506,000	46.9
		Rima, 1979	3,247	34	34	72,000	83,323,000	32.8
		Rasha, 1982	4,310	3	5	1,000	617,000	32.8
		Nimr, 1980	3,296	20	31	7,000	3,242,000	21.3
		Karim West, 1982	3,546	8	12	10,000	5,646,000	23.5
		Amal/Amal South, 1973	4,638	7	10	4,000	3,868,000	22.5
		Kaukab, 1983	8,282	1	1	2,000	644,000	35.8
		Marmul, 1977	5,087	161	167	45,000	94,680,000	22.0
		Birba, 1978	8,528	...	3	1,000	7,280,000	33.4
		Rahab, 1977	3,237	17	18	3,000	4,129,000	22.0
		Qaharir East, 1978	4,936	1	2	...	626,000	30.6
		Qata, 1979	4,707	9	13	2,000	2,893,000	26.2
		Qaharir, 1978	4,536	23	26	8,000	18,457,000	30.6
		Runib, 1978	3,215	6	6	...	33,000	20.3
		Jalmud, 1979	4,236	2	2	...	21,000	21.0
		Jalmud North, 1980	4,265	2	2	...	16,000	21.0
		Jawdah, 1984	3,570	3	3	1,000	191,000	22.0
	ELF GROUP	Sahmah, 1978	12,400	5	5	5,540	20,851,272	45.1
		Ramlat	...	1	1	177	54,916	...
	OCCIDENTAL PETROLEUM	Safah, 1983	6,500	11	11	2,732	2,018,752	37.8
		Total Oman		**789**	**972**	**558,449**	**2,406,599,940**	
PAKISTAN	**PAKISTAN OILFIELD LTD.(e)**	Balkassar, 1946	9,398	3	5			26.0
		Joya Mair, 1944	6,900	2	2			15.0
		Dhulian, 1936	8,899	...	...			48.0
		Khaur, 1915	9,306	1	1	10,587	97,409,000	...
	PAKISTAN PETROLEUM LTD.(e)	Adhi,(c) 1978	9,118- 9,190	3	3			48.5
	OGDC(e)	Toot, 1968	15,125	8	10			38.0
		Fimkassar, 1982	11,465	1	1			39.0
		Tando Alam, 1984	7,546- 8,205	8	9			41.4
	UNION TEXAS	Khaskeli, 1981	3,500	5	9	3,615	6,235,091	39.0
		Laghari, 1983	2,500	5	7	8,459	7,195,749	42.0
		Dabhi, 1984	5,500	3	4	2,117	851,936	39.0
		Mazari, 1984	5,200	2	4	802	292,864	43.0
		Other	...	...	8	...	...	31.0-46.0
	OCCIDENTAL	Dhurnal, 1984	13,100	3	3	15,420	10,030,702	38.0
		Total Pakistan		**44**	**66**	**41,000**	**122,015,342**	
PERU	**PETROMAR S.A.**	• Peña Negra, 1960	3,000- 8,500	191	268	11,793	99,691,201	38.0
		• Lobitos, 1960	3,500- 7,500	113	247	10,224	46,968,371	38.0
		• Litoral, 1955	1,500- 6,000	89	139	3,178	45,445,700	36.0-40.0
		• Providencia, 1967	3,000- 7,000	52	78	1,366	20,193,161	38.0-40.0
		Other	...	5	12	153	151,899	...
	OCCIDENTAL	• Bartra, 1979	8,000- 8,930	13	16	6,943	15,136,728	11.5
		• Capahuari Sur, 1973	11,800-12,900	16	26	12,485	124,934,962	35.6
		• Dorissa, 1978	9,800-10,600	10	12	11,892	31,385,834	34.0
		• Forestal, 1973	9,000- 9,900	8	10	7,503	30,228,795	26.7
		• Huayuri Sur, 1977	10,000-10,800	10	12	4,935	15,801,786	29.3
		• San Jacinto, 1978	7,200- 9,760	11	22	9,717	24,343,364	13.1-23.5
		• Shiviyacu, 1973	9,100-10,100	15	19	16,323	50,161,967	20.8
		• Jíbaro, 1974	10,110-10,155	6	6	3,638	5,162,629	11.3
		• Jibarito, 1981	9,000- 9,650	5	5	5,933	7,348,275	10.8
		Other	...	4	9	807	1,834,871	...

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
	OCCIDENTAL/BRIDAS	Talara area	1,343- 6,080	825	1,292	8,898	41,990,856	34.0
	PETROPERU	Talara-Lima area, 1869	2,000- 9,000	1,967	5,811	27,377	935,719,474	34.1
		Corrientes, 1971	10,000-12,600	32	38	27,668	78,271,610	29.8
		Pavayacu, 1972	9,600-11,300	12	14	3,512	14,110,612	30.2
		N. Esperanza, 1980	10,200-10,700	2	5	1,732	4,129,989	44.0
		Yanayacu, 1974	11,400-13,600	7	9	1,514	3,298,796	19.1
		Capirona, 1972	9,800-12,000	4	5	995	3,010,387	25.3
		Valencia, 1975	10,500-11,200	2	3	172	500,412	44.0
		Other	...	39	62	673	24,763,919	...
		Total Peru		**3,438**	**8,120**	**179,431**	**1,614,585,598**	
PHILIPPINES	ALCORN PHILIPPINES	• South Nido, 1977	6,576- 6,885	3	6	1,054	15,398,000	27.1
		• Matinloc, 1978	6,656- 6,750	5	5	3,217	7,893,000	43.8
	ALCORN PALAWAN	• Cadlao, 1977	5,734- 5,881	2	2	2,640	8,505,000	45.6
		Total Philippines		**10**	**12**	**6,911**	**31,796,000**	
QATAR(e)	QGPC	• Bul Hanine, 1970	6,000	14	15	332,000	3,942,055,000	35.0
		Dukhan, 1940	6,500	116	161			41.1
		• Idd El Shargi, 1960	4,500- 8,250	25	31			35.0
		• Maydan-Mahzam, 1963	7,000	19	24			38.0
		Total Qatar		**174**	**231**	**332,000**	**3,942,055,000**	
RAS al KHAIMAH	CHEVRON	• Saleh, 1983	14,500	6	6	9,811	9,180,868	50.0
		Total Ras al Khaimah		**6**	**6**	**9,811**	**9,180,868**	
SAUDI ARABIA(e)	ARAMCO	Abqaiq, 1940	6,690	588	588	4,837,000	52,677,359,000	37.0
		Abu-Hadriya, 1940	9,340					35.0
		• Abu-Safah, 1963	6,600					30.0
		• Berri, 1964	8,300					32.0-34.0
		Dammam, 1938	4,800					35.0
		Fadhili, 1949	8,050					39.0
		Ghawar, 1948	6,920					34.0
		Harmaliyah, 1971	8,430					35.0
		Khurais, 1957	5,200					33.0
		Khursaniyah, 1956	6,560					31.0
		• Manifa, 1957	7,950					
		• Marjan, 1967	6,800					33.0
		• Qatif, 1945	7,100					33.0-34.0
		• Safaniyah, 1951	5,100					27.0
		• Zuluf, 1965	5,800					32.0
		Total Saudi Arabia		**588**	**588**	**4,837,000**	**52,677,358,000**	
SHARJAH	CRESCENT(e)	• Muberek,(c) 1972	...	4	4	9,840	78,096,900	37.0
	AMOCO	Saaja and Moveyid,(c) 1980	10,200-12,300	16	16	51,302	76,800,000	50.0
		Total Sharjah		**20**	**20**	**61,142**	**154,896,900**	
SPAIN	SHELL ESPANA	• Amposta Marino North, 1970	10,000	3	3	1,450	54,929,000	37.0
		• Castellon B5/8, 1976	9,000	...	3	450	14,464,000	35.0
	CHEVRON	Ayoluengo, 1964	4,600- 5,200	35	51	1,855	14,224,701	33.0
	ENIEPSA	• Tarraco, 1973	8,800	...	3	445	14,547,234	35.2
		• Casablanca, 1975	8,900	7	9	32,062	68,688,289	32.6
		• Dorada, 1975	6,700	...	4	...	16,565,228	21.5
		• Gaviota,(c) 1980	8,300	3	3	397	145,053	52.7
		• Salmonete, 1984	12,600	...	1	1,131	1,529,323	44.0
		Total Spain		**48**	**77**	**37,790**	**185,092,828**	
SURINAME	STAATSOLIE	Tambaredjo, 1981	984	56	56	1,938	1,505,000	15.9
		Total Suriname		**56**	**56**	**1,938**	**1,505,000**	
SYRIA	SPC	Alian, 1974	5,900	25	37	990	6,130,000	19.0
		Gbebeh, 1976	2,300	54	75	4,080	5,900,000	18.0
		Jebisseh, 1968	2,000- 3,300	132	219	7,040	25,050,000	18.0
		Karachok, 1956	6,500	103	119	28,900	157,240,000	20.0
		Rumilan, 1962	6,500	59	66	5,275	44,400,000	24.0
		Soudie, 1959	6,500	532	579	106,080	695,000,000	24.0
		Tichrine, 1976	2,600	58	73	3,640	11,510,000	18.0
		Other	...	...	...	5,400	5,320,000	...
		Total Syria		**963**	**1,168**	**161,405**	**950,550,000**	

		Name of field, discovery date	Depth, ft	No. of wells — Producing	No. of wells — Total	Production — 1986 average B/d	Production — Cumulative to Dec. 31, 1986 Bbl	°API gravity
THAILAND	**UNOCAL**	• Erawan,[c] 1973	7,000	67	118	6,685	12,120,000	54.6
		• Baanpot,[c] 1980	7,000	...	10	...	1,020,000	54.6
		• Platong,[c] 1976	8,500	29	43	4,219	2,750,000	59.1
		• Satun,[c] 1980	8,500	28	57	3,370	2,290,000	55.1
	THAI SHELL	Sirikit, 1981	5,258- 5,976	42	48	19,900	22,250,000	41.0
		Sirikit West, 1983	5,500	1	2	433	281,224	41.0
		Total Thailand		**167**	**278**	**34,607**	**40,711,224**	
TRINIDAD	**AMOCO**	• Teak, 1971	15,191	55	95	37,557	215,624,000	29.3
		• Samaan, 1971	11,780	36	48	13,141	169,420,000	36.8
		• Poui, 1974	11,650	33	56	29,967	142,726,000	34.0
		• Cassia, 1973	12,700	5	7	6,652	8,312,000	45.0
		Mora, 1986	8,500	2	5	458	167,000	...
	TNA	• Soldado, 1955	11,000	337	638	36,874	448,938,000	...
		• Fortin Offshore (FOS), 1954	...	11	35	272	6,896,000	...
	TRINTOPEC	Palo Seco/Erin/McKenzie, 1926	12,718	492	1,539	9,021	113,863,000	...
		Fyzabad/Apex/Quarry, 1920	11,000	322	1,031	3,802	169,042,000	...
		Coora/Quarry, 1936	14,000	184	722	1,856	90,401,000	...
		Galeota, 1963	6,304	50	105	3,324	14,148,000	...
		Central Los Bajos, 1973	...	130	192	2,586	7,558,000	...
		Other	...	220	914	2,401	60,003,000	...
	TRINTOC	Area IV & Guapo, 1913	10,626	76	192	1,371	38,225,000	...
		Parrylands, 1913	10,626	110	496	1,652	39,519,000	...
		Point Fortin C & W, 1907	10,626	133	548	2,566	39,861,000	...
		Point Fortin E., 1929	11,000	49	168	753	26,353,000	...
		Penal, 1936	11,067	76	289	1,077	61,686,000	...
		Catshill, 1950	9,693	37	134	381	22,904,000	...
		Brighton, 1908	7,500	66	616	766	72,428,000	...
		Barrackpore, 1911	11,100	56	356	2,225	29,984,000	...
		Guayaguayare, 1902	10,750	118	698	1,550	85,846,000	...
		Forest Reserve, 1913	11,000	293	2,042	4,403	257,340,000	...
		Oropouche, 1944	9,100	34	128	184	6,577,000	...
		Palo Seco, 1929	12,700	78	926	2,173	92,316,000	...
		Trinity, 1956	9,700	13	95	197	15,046,000	...
		Other	...	90	810	884	77,852,000	...
	PCOL	All fields	...	105	493	784	20,332,000	...
		Total Trinidad		**3,211**	**13,378**	**168,877**	**2,333,387,000**	
TUNISIA	**ELF-ETAP**	• Ashtart	10,500	13	15	23,230	165,483,000	29.8
	ELF-SEREPT	Douleb/Semmama	3,937	15	15	966	17,934,000	40.0
		Tamesmida	3,937	3	3	228	1,973,000	36.9
	CFPT	Sidi El Itayem, 1971	7,500- 7,800	18	20	2,881	20,296,741	44.0
	SHELL	• Tazerka, 1979	4,111- 4,232	8	10	5,130	11,572,000	30.0
	ETAP-AGIP-FINA (SODEPS)[e]	Makrouga, 1980	6,230	3	3			45.0
		Larich, 1979	7,550	1	1			40.7
		Debech, 1980	7,550	1	1	75,065	475,986,500	42.6
	AGIP-TUNISIA (SITEP)[e]	El Borma, 1964	8,250- 8,900	87	101			42.5
		Chouech es Saida, 1971	12,600	1	1			42.9
		Total Tunisia		**150**	**170**	**107,500**	**693,245,241**	
TURKEY	**SHELL**	Barbes & Deep, 1971	...	16	17	1,950	15,012,000	29.7
		Baysu, 1985	...	3	3	480	175,000	33.3
		Bektas, 1985	...	...	...	280	202,000	33.7
		Beykan, 1964	...	35	39	3,580	57,507,000	33.2
		Cobantepe, 1975	...	2	2	50	218,000	32.8
		Katin, 1971	...	2	2	100	3,636,000	29.5
		Kayakoy, 1960	...	14	20	1,330	18,885,000	38.2
		Kayakoy-West, 1964	...	17	18	2,870	27,948,000	34.7
		Kervan, 1982	...	1	1	10	4,000	30.3
		Kurkan, 1963	...	29	30	2,640	47,564,000	31.4
		Kurkan-South, 1965	...	...	...	360	6,431,000	34.5
		Malatepe, 1970	...	13	14	950	6,647,000	32.7
		Piyanko, 1968	...	1	1	90	1,433,000	35.5
		Sahaban, 1965	...	14	17	700	12,755,000	34.5
		Sahaban South East, 1983	...	...	...	190	269,000	32.0
		Sebyan, 1973	...	1	1	10	104,000	33.4
		Sincan, 1979	...	8	9	1,070	2,491,000	31.4
		Yatir-East, 1973	...	7	9	650	4,937,000	30.9
		Yenikoy-East, 1974	...	2	2	190	3,569,000	31.3
		Yesildere, 1985	...	3	3	290	106,000	34.7
	MOBIL	Selmo, 1964	5,800	20	21	5,003	63,699,214	34.2
		Bulgurdağ, 1961	4,500	1	3	42	2,452,242	37.9

	Name of field, discovery date	Depth, ft	No. of wells Producing	No. of wells Total	Production 1986 average B/d	Production Cumulative to Dec. 31, 1986 Bbl	°API gravity
TPAO	Raman, 1940	4,500	96	106	4,704	46,914,924	18.7
	Bati Raman, 1961	4,200	79	84	2,133	32,798,101	13.3
	Garzan, 1956	4,700	19	19	2,489	32,562,219	26.2
	Germik, 1968	6,500	9	10	468	3,145,256	18.8
	Mağrip, 1961	5,700	8	9	320	14,342,777	18.4
	Silivanka, 1962	8,200	10	10	900	7,324,243	23.0
	Beycayir, 1976	7,700	2	2	34	176,686	26.1
	Celikli, 1964	10,500	8	8	2,416	2,076,359	35.2
	Sezgin, 1970	5,600	...	...	...	87,559	17.0
	Oyuktas, 1972	7,600	...	...	...	592,005	31.0
	Devecatak, 1973	4,800	1	1	48	214,312	37.0
	K. Osmancik, 1971	3,800	2	2	236	1,929,635	37.6
	Adiyaman, 1971	5,800	15	15	885	7,769,518	27.6
	G. Adiyaman, 1977	5,000	...	...	...	115,836	20.4
	Kuzey Adiyaman, 1977	9,500	...	...	...	59,325	32.0
	Bölükyayla, 1977	10,300	...	...	...	167,663	35.0
	Saricak, 1973	5,250	4	4	200	2,478,887	31.5
	G. Saricak, 1973	5,250	11	11	649	3,578,913	31.5
	Yeniköy, 1973	6,400	13	13	1,209	7,937,915	31.4
	G. Kayaköy, 1976	8,600	3	3	657	1,829,959	30.4
	Sivritepe, 1977	8,200	1	1	70	467,813	33.4
	Camurlu, 1976	5,600	15	15	600	688,546	12.2
	Ikiztepe, 1976	4,900	...	...	...	88,051	11.3
	G. Sahaban, 1978	5,450	11	11	1,320	2,003,791	33.2
	G. Dincer, 1981	5,350	11	11	737	4,015,853	16.7
	Selmo B. Selmo, 1981	5,500	2	2	242	398,265	34.0
	Mehmetdere, 1982	6,700	...	2	...	149,057	31.0
	Karteltepe, 1982	6,550	3	3	324	626,979	32.0
	Cemberlitas, 1983	6,500	21	21	4,410	4,471,652	30.5
	Alcik, 1983	6,500	1	1	69	49,754	32.0
	Cukurtas, 1985	10,000	2	2	138	191,482	36.0
	B. Kozluca, 1985	5,000	11	11	781	179,345	12.0
	Akpinar, 1984	10,500	2	2	308	47,482	31.6
	B. Firat, 1986	8,150	3	3	720	153,680	34.8
ALADDIN MIDDLE EAST LTD.	Kahta, 1958	3,500	10	23	130	3,993,627	11.0
	Yasince, 1974	6,400	2	4	10	1,000	31.0
	Total Turkey		**564**	**621**	**50,042**	**450,672,925**	

UNITED KINGDOM

	Name of field, discovery date	Depth, ft	No. of wells Producing	No. of wells Total	Production 1986 average B/d	Production Cumulative to Dec. 31, 1986 Bbl	°API gravity
AMOCO	• Montrose, 1969	8,200	12	20	13,317	70,559,928	40.5
	• NW Hutton, 1975	12,000	20	30	50,778	69,847,559	36.0
BP	Wytch Farm Bridport Sand,[e] 1974	2,910	8	11	2,700	7,480,800	37.0
	Wytch Farm Sherwood Sandstone,[e] 1977	5,115	3	5	3,400	4,010,400	38.0
	East Midlands, 1939	3,500	68	148	1,210	24,475,014	36.0
	Kimmeridge,[e] 1960	1,800	1	3	150	2,783,700	40.0
	Welton, 1983	5,000	12	18	1,274	758,081	36.0
	Nettleham, 1983	8,850	1	3	255	208,451	35.0
	• Forties and Echo, 1970	7,000	51	79	388,325	1,683,600,000	37.0
	• Buchan, 1974	8,700	9	9	22,199	51,378,213	33.0
	• Magnus, 1974	9,500	11	19	128,742	147,806,116	39.0
BRITOIL PLC	Thistle, 1973	9,000	33	46	60,378	294,904,274	38.0
	Beatrice A, 1976	6,750	17	25	28,415	62,755,583	39.0
	Beatrice B, 1976	6,500	8	10	13,954	14,303,819	39.0
	Deveron, 1972	9,000	2	2	6,393	6,029,459	38.2
	Clyde, 1978	12,400	...	...	...	...	...
CHEVRON	• Ninian, 1974	10,000	53	64	199,011	703,561,138	35.0
CONOCO	• Statfjord, 1974	9,500	51	82	*111,798	*151,802,212	39.0
	• Murchison, 1975	9,900	18	26	*57,063	*163,819,250	38.0
	• Hutton, 1973	10,000	13	23	75,616	57,673,000	33.0
	• Dunlin, 1973	9,100	21	32	42,138	235,386,000	36.0
HAMILTON BROS. OIL & GAS LTD.	• Argyll, 1971	9,000- 9,400	7	7	10,100	60,000,00	38.0
	• Duncan, 1980	9,600-10,000	4	4	7,700	14,700,000	36.0
	• Innes, 1983	12,300-12,600	2	2	4,800	3,300,000	45.0
MARATHON OIL COMPANY	• Brae South Crude Oil, 1975	12,700-13,437	13	22	104,500	106,317,470	35.0
MOBIL	• Beryl, 1972	9,900-11,500	38	46	95,005	321,716,733	37.4
OCCIDENTAL	• Claymore, 1974	8,100	26	27	77,315	281,735,000	30.1
	• Piper, 1973	8,100	23	27	172,362	749,895,000	37.0
	• Scapa, 1981	8,100	2	2	7,973	4,789,000	32.0
SHELL	• Auk, 1971	NA	9	11	10,560	72,654,000	38.0
	• Brent, 1971	NA	66	72	401,000	947,465,000	37.8
	• Cormorant S. & C., 1972	NA	11	13	45,350	79,153,000	36.0
	• Cormorant N., 1974	NA	11	15	101,580	129,977,000	34.9
	• Dunlin A, 1973	NA	21	27	40,200	231,873,000	36.0
	• Fulmar, 1975	NA	11	12	158,760	207,947,000	40.0
PHILLIPS	• Maureen, 1973	8,000- 8,700	3	12	64,658	88,979,420	36.0

		Name of field, discovery date	Depth, ft	No. of wells — Producing	No. of wells — Total	Production — 1986 average B/d	Production — Cumulative to Dec. 31, 1986 Bbl	°API gravity
	TEXACO NORTH SEA	• Tartan, 1974	10,217-12,614	8	15	23,000	47,395,266	37.0-42.0
		• Highlander, 1976	8,759- 9 372	4	5	28,600	17,457,415	34.0-37.0
		• Petronelia, 1975	8,110	1	1	687	250,871	40.1
	UNOCAL	• Heather, 1973	10,800	28	37	20,289	67,726,568	34.3
*U.K. production share		**Total United Kingdom**		**710**	**1,012**	**2,581,555**	**7,186,474,700**	
YEMEN, NORTH$^{(e)}$	HUNT OIL	Alif, 1984	NA	45	45	10,000	NA	...
		Total North Yemen		**45**	**45**	**10,000**	**NA**	
VENEZUELA	PDV/ ANZOA-TEGUI	Boca, 1971	9,500	19	77	965	76,975,699	32.2
		Caico Seco, 1946	6,500- 7,300	22	104	2,994	66,363,821	33.1
		Chimire, 1948	7,000- 7,200	52	199	5,195	369,855,789	34.6
		Dacion, 1957	6,700	86	143	7,207	219,404,138	21.8
		Elias, 1954	5,000- 6,470	77	163	6,545	117,763,633	37.5
		El Roble, 1939	3,500-11,500	26	65	2,596	43,136,764	50.0
		Guara, 1946	5,000-10,000	186	372	17,256	565,967,286	25.7
		Inca, 1948	7,250	18	52	1,419	31,353,195	28.2
		Leona, 1938	2,200-12,800	87	303	9,277	191,942,461	24.7
		La Ceiba, 1946	9,450	27	36	2,358	46,744,003	42.4
		Mata, 1954	8,970-10,516	96	405	9,816	507,369,005	32.5
		Merey, 1937	5,400- 5,700	143	599	3,801	244,514,638	12.4
		Nipa, 1945	6,000- 8,500	62	301	15,310	508,525,895	28.0
		Oscurote-Norte, 1952	9,513	15	78	745	121,987,572	19.2
		Oficina, 1937	5,900	133	481	13,585	779,693,149	22.6
		Soto, 1950	9,500	10	76	1,790	164,260,467	37.8
		Sta. Ana, 1936	8,500	74	108	2,164	59,625,655	42.6
		San Joaquin, 1939	6,550	59	100	9,462	46,042,234	48.8
		Sta. Rosa, 1941	8,500	172	207	11,420	292,627,599	50.4
		Yopales, 1937	4,600	104	258	2,615	158,365,924	23.6
		Zanjas, 1958	13,270	11	17	2,615	35,993,342	41.0
		Zapatos, 1955	11,500	25	65	3,565	143,135,310	35.9
		Zorro, 1953	11,100	10	28	1,620	70,829,678	35.9
		Zulus, 1957	12,710	8	21	1,665	23,694,696	42.1
		Zumo, 1954	9,200	6	34	1,421	68,006,051	26.3
		La Ceibita, 1963	9,878	24	47	3,144	80,344,757	41.8
		Adjuntas, 1957	5,000	1	53	307	10,764,084	13.9
		Arecuna	1,300	17	116	3,398	7,238,191	11.2
		Bare	1,100	81	248	11,832	24,907,126	10.3
		El Toco, 1948	2,300	35	44	1,120	14,391,186	52.2
		Guario, 1940	3,400	17	61	1,607	25,824,591	43.8
		Isla, 1954	...	200	1,078	2,792	15,439,580	43.5
		Other	...	...	...	28,723	386,903,284	...
	PDV/MONAGAS	Acema, 1960	...	29	58	37,643	45,084,539	29.0
		Aguasay, 1955	8,100-13,400	13	43	5,309	95,553,344	31.3
		Jobo, 1956	3,600- 4,000	102	432	29,928	255,453,735	11.0
		Morichal, 1958	3,312	18	191	4,646	168,931,207	8.7
		Orocual, 1953	2,954	17	51	3,630	28,050,916	25.1
		Oritupano, 1950	7,657	50	175	4,260	33,585,846	19.1
		Pirital, 1958	450- 1,100	42	81	702	27,069,238	30.2
		Quiriquire, 1928	7,000- 7,200	1	475	1,425	759,655,325	23.5
		Sta. Barbara, 1941	5,020- 6,500	40	316	1,143	166,888,311	24.2
		Tacat, 1953	1,820- 3,670	23	133	299	44,948,976	18.2
		Temblador, 1936	3,500- 4,500	6	48	1,374	108,875,519	19.5
		Aguasay N., 1955	4,849	6	7	5,552	3,422,603	45.4
		Acema-Casma	4,023	56	84	5,164	64,428,160	24.1
		Cerro Negro	1,200	23	297	14,606	15,894,104	8.6
		Mata Acema, 1951	...	25	62	8,519	85,147,488	24.0
		Onado, 1971	4,791	16	25	4,395	16,993,375	27.7
		Oritupano N., 1954	...	20	33	5,219	23,749,618	28.4
		Pilon, 1937	...	86	139	13,394	146,025,237	12.3
		Carisito	4,881	1	1	...	255,906	...
		Josepin, 1938	4,253	2	94	773	194,569,772	26.5
		Manresa, 1954	...	1	3	66	3,317,079	16.7
		El Furrial, 1986	...	2	2	3,218	1,174,459	26.8
		Other	...	12	225	3,799	118,942,583	...
	PDV/ZULIA	Boscan, 1946	9,708	89	389	36,449	719,717,348	10.4
		Bachaquero, 1930	10,720	1,344	3,759	255,572	6,276,285,818	23.2
		Cruces-Manueles, 1916	3,000- 8,000	35	133	2,619	175,255,977	39.2
		Cabimas, 1917	2,200	709	1,258	60,686	1,576,957,357	22.8
		Centro, 1959	9,600-11,000	195	248	215,465	794,851,525	36.2
		La Concepcion, 1953	3,148- 8,000	56	162	4,346	134,966,791	34.5
		La Paz, 1925	4,268- 8,000	57	156	11,285	650,745,548	30.6
		Lago, 1959	11,450	32	65	17,266	224,213,958	32.0
		Lagunillas, 1926	3,000	2,250	5,158	369,333	10,563,836,427	25.6
		Lama, 1957	8,320	248	400	129,903	2,485,058,736	32.5
		Lamar, 1958	13,000	107	184	67,098	1,085,863,418	35.5
		Mara, 1945	5,240	51	105	6,556	408,684,358	24.0

				No. of wells		Production		
		Name of field, discovery date	Depth, ft	Producing	Total	1986 average B/d	Cumulative to Dec. 31, 1986 Bbl	°API gravity
		Mene Grande, 1914	4,130	238	584	6,883	634,097,101	18.4
		Motatan, 1952	...	17	30	15,800	64,245,260	20.2
		Sibucana, 1948	13,450	1	3	453	43,182,208	30.8
		Tia Juana, 1928	3,000	1,394	3,095	222,455	3,881,898,431	18.2
		Urdaneta, 1970	10,000	38	285	22,705	112,968,562	26.7
		West-Tarra, 1942	4,250- 5,500	17	44	2,505	71,282,806	39.2
		Ceuta	16,380	101	168	54,741	412,438,738	30.6
		Sur del Lago	17,830	4	5	128	324,043	33.6
		Other	...	43	124	87,974	92,130,705	...
	PDV/BARINAS	Hato, 1965	9,550	13	18	2,081	42,095,485	24.4
		Maporal, 1957	10,950	14	14	3,051	13,454,261	26.7
		Paez, 1963	NA	57	67	9,202	57,441,699	19.6
		Silvan, 1949	10,860	21	22	4,194	47,064,669	29.0
		Silvestre, 1948	8,860	30	48	4,258	134,841,247	23.6
		Sinco, 1953	8,500- 9,100	57	84	9,891	254,147,675	23.7
		Other	...	4	9	4,018	6,297,830	25.9
	PDV/FALCON	Hombre Pintado, 1927	...	...	50	...	8,489,429	24.2
		El Mene, 1921	...	...	45	...	778,077	38.1
		Media, 1928	...	...	4	...	30,173,477	38.1
		Tiguaje, 1953	...	5	23	218	10,122,325	27.6
		Las Palmas, 1928	...	...	13	...	443,963	29.0
	PDV/GUARICO	Budare, 1958	4,523	22	41	4,010	67,539,444	29.6
		Las Mercedes, 1942	4,500	...	184	31	133,135,289	22.8
		Ruiz, 1949	4,500	7	42	133	33,140,920	29.9
		Barzo, 1959	...	3	6	245	2,209,631	29.0
		Bella Vista, 1952	...	11	86	136	12,312,672	21.6
		Jobal, 1960	...	7	12	143	1,835,855	36.3
		Saban, 1947	...	15	70	265	21,889,183	41.1
		Other	...	9	140	209	352,322,467	...
	PDV/AMACURO	Tucupita, 1945	...	2	67	192	67,054,571	16.6
		Total Venezuela		**9,797**	**26,314**	**1,977,902**	**39,833,823,427**	
WEST GERMANY	**WINTERSHALL A.G.**	Emlichheim, 1944	3,116	74	130	3,448	42,238,997	24.5
		Ruehlertwist, 1949	2,919	72	134	1,919	30,340,916	25.0
		Aldorf, 1952	4,100	48	106	574	16,695,035	33.0
		Bockstedt, 1954	4,264	34	48	1,268	20,077,593	27.4
		Dueste, 1954	3,936	33	71	381	11,979,018	33.0
		Pattensen, 1954	2,165	5	7	62	1,016,330	29.3
		Landau, 1955	3,936	73	78	1,231	26,148,532	36.9
		Sohnedeneck, 1956	5,182	19	29	224	5,059,601	27.5
		Ruelzheim, 1984	7,544	2	2	1	40,751	37.7
		Rheinzabern, 1959	5,576	1	1	65	17,004	37.9
		Moenchsrot, 1958	5,248	15	23	296	10,342,375	38.1
		Kirchdorf, 1982	5,737	1	1	13	48,745	38.5
		Oberschnarzach, 1978	4,920	4	4	173	550,090	37.7
		Arlesried, 1964	4,920	11	20	636	13,613,363	38.5
		Maximiliansau, 1959	5,363	1	1	4	14,387	41.0
		Hauerz, 1985	8,639	5	5	271	133,996	40.4
		Meckelfeld, 1954	6,396	21	28	372	13,773	27.5
		Dickel, 1953	3,936	37	60	602	6,422,933	28.3
		Nienhagen, 1925	3,729	12	12	57	10,856,342	30.0
		Wathlingen, 1939	2,624	8	9	40	1,393,287	30.0
		Eicklingen, 1937	2,460	12	13	50	3,617,738	30.0
		Schwabmunchen, 1976	4,428	1	1	2	38,974	25.7
		Aitingen, 1977	6,232	4	4	1,234	3,537,398	31.1
	DEUTSCHE TEXACO A.G.	Boostedt, 1952	5,900	27	43	762	17,936,880	32.0
		Ploen-Ost, 1958	8,850	30	63	1,112	50,293,120	33.0
		Preetz, 1962	8,200	22	30	371	11,401,670	26.0
		• Schwedeneck-See, 1978	4,900	15	15	7,713	4,788,540	28.0
		Hankensbuettel-Sued, 1954	4,900	46	85	2,950	80,950,880	27.0-35.0
		Hardesse, 1957	8,200	35	69	741	8,467,442	40.0
		Oerrel-Sued, 1954	4,600	25	46	1,115	11,009,350	26.0
		Hohne, 1951	5,250	29	55	866	40,335,040	33.0
		Lieferde, 1956	2,600	24	42	427	20,134,330	33.0
		Wesendorf, 1943	4,650	21	37	347	17,283,120	25.0-40.0
		Other, 1935-84	2,300- 8,200	23	69	541	30,324,970	19.0-37.0
	MOBIL A.G.	Hofolding, 1980	11,100	3	3	577	680,184	28.0-30.0
		Bavaria	4,660- 6,190	15	31	94	7,526,758	20.0-25.0
		Hannover	980- 6,630	52	70	958	27,929,829	25.0-35.0
		Viogtei, 1953	980- 1,900	77	108	694	24,692,465	32.0-34.0
		Süd-Oldenburg, 1950	2,630- 6,800	85	157	1,214	39,085,351	31.0-39.0
		Weser Ems	2,000- 2,450	19	25	330	5,889,334	23.0
	OTHER OPERATORS[a]	Georgsdorf, 1944	1,800- 2,600					24.0-29.0
		Meppen, 1960	4,000					28.0-30.0
		Ruehlermoor, 1949	2,000- 4,700					28.0-30.0
		Scheerhorn, 1949	3,550- 3,750					30.0
		Reitbrook, 1937	1,450- 2,100					29.0

Production facilities at Dhabi field in the Badin block in southeastern Pakistan are operated by Union Texas. Oil production from the Union Texas joint venture's operations in Pakistan has climbed from 4,200 gross barrels daily in 1982 to about 15,000 b/d from four fields.

WORLDWIDE PRODUCTION

		Name of field, discovery date	Depth, ft	No. of wells Producing	No. of wells Total	Production 1986 average B/d	Production Cumulative to Dec. 31, 1986 Bbl	°API gravity
		Eldingen, 1949	4,750					35.0
		Lueben, 1955	3,950					35.0-38.0
		Oelheim-Sued, 1968	7,650	2,088	2,088	45,505	409,990,545	33.0
		Ruehme, 1954	1,950					...
		Sinstorf, 1960	6,750- 7,150					...
		Suderbruch, 1949	3,750- 7,550					19.0-38.0
		Vorhop, 1952	2,950- 6,900					36.0
		Barenburg, 1953	2,300- 3,300					29.0
		Bramberge, 1958	2,560- 3,300					29.0
		Gross Lessen, 1969	3,300					...
		Wehrbleck, 1947	3,400					33.0
		Total West Germany		**3,129**	**3,829**	**79,240**	**1,507,916,986**	
ZAIRE	**CHEVRON**	• GCO, 1970	7,000- 9,000	3	7	507	6,139,661	29.0
		• Mibale, 1973	5,000- 6,000	7	8	15,356	76,221,050	30.0
		• Mwambe, 1979	6,150	2	2	162	575,438	30.4
		• Motoba, 1976	11,098	2	2	1,430	654,244	44.3
		Lukami, 1983	12,400	5	5	4,170	5,120,824	35.0
		Libwa, 1981	5,500	...	2	...	...	33.0
	ZAIREP (FINA)	East Mibale, 1978	6,000	...	1	...	397,000	34.0
		Kinkasi, 1972	3,700	40	42	3,800	5,147,000	31.0
		Liawenda, 1972	3,900	27	32	2,400	2,007,000	31.0
		Nsiamfumu, 1977	8,300	...	1	...	5,000	34.0
		Kifuku, 1983	3,400	1	1	40	28,000	31.0
		Makelekese, 1983	3,600	8	8	630	558,000	31.0
		Muanda, 1972	3,600	6	6	550	370,000	31.0
		Tshiende, 1978	6,000	3	4	3,440	2,220,000	34.0
		Total Zaire		**104**	**121**	**32,465**	**99,443,217**	

Worldwide refining

AILLEEN CANTRELL
Director of Editorial Surveys

All figures in barrels per calendar day

All figures are as of 1-1-88

LEGEND

Numbers identify processes in table

Thermal processes
1. Gas oil cracking
2. Thermal cracking
3. Visbreaking
4. Fluid coking
5. Delayed coking
6. Other

Catalytic cracking
1. Fluid
2. Other

Catalytic reforming
- Semiregenerative:
  1. Conventional catalyst
  2. Bimetallic catalyst
- Cyclic:
  3. Conventional catalyst
  4. Bimetallic catalyst
- Other:
  5. Conventional catalyst
  6. Bimetallic catalyst

Catalytic hydrocracking
1. Distillate upgrading
2. Residual upgrading
3. Lube-oil manufacturing
4. Other

Catalytic hydrorefining
1. Residual desulfurization
2. Heavy gas oil desulfurization
3. Cat cracker and cycle stock feed pretreatment
4. Mid distillate
5. Other

Catalytic hydrotreating
1. Pretreating cat reformer feeds
2. Naphtha desulfurizing
3. Naphtha olefin or aromatics saturation
4. Straight-run distillate
5. Other distillates
6. Lube oil "polishing"
7. Other

Alkylation
1. Sulfuric acid
2. Hydrofluoric acid

Aromatics/Isomerization
1. BTX
2. Hydrodealkylation
3. Cyclohexane
4. C_4 feed
5. C_5 feed
6. C_5 and C_6 feed

Hydrogen
1. Steam methane reforming
2. Steam naphtha reforming
3. Partial oxidation
4. Cryogenic
5. Other

Calendar-day figures reported in this survey are the average volume a refinery unit processes each day including downtime used for turnarounds. This is actual total volume for the year divided by 365. (Stream day figures represent the amount a unit can process when running full capacity for short periods.)

INACTIVE REFINERIES

Abu Dhabi
1. Abu Dhabi National Oil Co., Umm Al-Nar 1, 14,250 b/cd.

Canada
2. Shell Canada Ltd., Bowden, Alberta, 5,000 b/cd.

Germany
3. Esso Ag, Hamburg, 90,000 b/cd.

Italy
4. Lombarda Petroli, Villasanta, 23,500 b/cd.

Japan
5. Nippon Petroleum Refining CL, Kudamatsu, 22,000 b/cd.
6. Toa Nenryo Kogyo, Shimizu, 28,500 b/cd.

Mozambique
7. Petromoc, Lingamo-Matola-Maputo, 17,000 b/sd.

Venezuela
8. Maraven, Bajo Grande, Maracaibo, 57,000 b/cd.

Survey of operating refineries worldwide (capacities as of Jan. 1, 1988)

			Charge capacity, b/cd							Production capacity, b/cd					
Country	No. plants	Crude, b/cd	Vacuum distillation	Thermal operations	Catalytic cracking	Catalytic reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alkylation	Aromatics-isomerization	Lubes	Asphalt	Hydrogen (MMcfd)	Coke (t/d)
Abu Dhabi	2	180,000	47,000	....	....	30,055	27,000	....	100,399	....	....	....	....	53.0	....
Algeria	4	464,700	15,000	....	....	55,600	....	....	23,600	....	1,900	2,400	5,300	....	....
Angola	1	32,100	1,900	....	....	1,900	....	2,800	3,800	....	....	....	950	....	....
Argentina	11	689,500	257,900	120,800	112,450	39,600	23,900	....	55,500	6,850	....	6,550	21,800	19.0	900
Australia	10	637,100	179,300	....	184,800	154,800	....	33,700	242,500	32,750	13,600	13,200	12,900	....	....
Austria	1	204,000	68,000	17,000	24,000	32,000	....	68,000	49,300	....	9,000	2,300	5,850	....	....
Bahrain	1	250,000	144,000	19,000	36,000	17,100	....	45,000	35,100	1,300	....	....	4,500	26.2	....
Bangladesh	1	31,200	3,530	....	....	1,650	....	2,430	1,940	....	....	....	1,200	....	....
Barbados	1	3,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Belgium	4	630,500	298,100	62,800	102,000	80,300	....	190,100	182,700	7,710	....	....	25,300	46.0	....
Bolivia	3	46,930	2,100	....	....	14,158	....	....	14,613	....	....	500	54	....	....
Brazil	13	1,407,300	698,000	33,800	350,500	24,800	....	....	133,400	....	....	16,000	13,800	20.1	1,265
Brunei	1	10,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Burma	2	26,300	4,800	1,700	....	....	....	....	....	....	....	....	....	....	40
Cameroon	1	43,000	....	....	....	6,500	....	10,000	10,000	....	....	....	....	....	....
Canada	27	1,868,900	654,650	78,150	385,550	368,650	189,550	23,900	755,580	71,585	46,470	22,860	105,950	237.5	791
Chile	2	141,000	79,000	18,400	37,000	5,300	....	....	5,300	1,000	....	....	....	....	....
China, Taiwan	2	600,000	123,500	15,000	25,000	62,500	20,000	155,000	67,000	3,500	17,427	....	11,181	105.0	920
Colombia	4	226,000	120,000	60,000	91,000	6,000	....	....	34,240	11,300	5,100	2,300	2,400	21.0	....
Congo	1	21,000	8,000	....	....	2,000	2,000	....	3,500	....	....	....	....	....	....
Costa Rica	1	16,200	600	6,500	....	1,200	....	....	3,400	....	....	....	300	....	....
Cote d'Ivoire	2	60,000	42,000	....	....	16,600	11,500	11,500	21,000	....	....	....	6,000	....	....
Cyprus	1	16,000	1,800	....	....	3,400	....	....	6,000	....	....	....	700	....	....
Denmark	3	177,000	41,050	70,670	....	31,100	....	10,000	84,200	....	3,400	....	8,000	....	....
Dominican Republic	2	48,500	....	....	....	7,900	....	....	21,200	....	....	....	....	0.4	....
Ecuador	3	122,000	43,020	25,200	16,000	2,780	....	....	....	....	....	....	....	....	....
Egypt	7	452,110	46,725	16,470	....	30,940	....	....	84,386	804	1,452	3,848	6,633	5.5	541
El Salvador	1	17,000	1,900	....	....	3,800	....	....	12,100	....	....	....	600	....	....
Ethiopia	1	18,000	1,600	....	....	2,200	....	....	4,100	....	....	....	570	....	....
Finland	2	241,000	81,400	46,300	41,800	42,900	14,200	104,500	57,940	3,780	....	....	7,600	20.0	....
France	14	1,940,600	678,600	163,550	288,800	258,700	13,500	262,300	552,400	9,925	15,100	31,600	48,650	28.0	....
Gabon	1	23,000	....	7,200	....	1,500	....	....	6,000	....	....	....	....	....	....
Germany	16	1,647,800	619,800	286,400	174,700	307,100	96,200	326,700	652,150	11,300	65,090	9,000	77,700	156.5	1,620
Ghana	1	28,000	....	....	....	5,550	....	....	....	....	....	....	....	....	....
Greece	4	384,500	118,100	41,120	50,500	51,300	....	41,100	100,200	5,700	4,250	3,100	5,600	9.1	....
Guatemala	1	16,000	....	....	....	3,000	....	...	5,000	....	....	....	....	....	....
Honduras	1	14,000	....	....	....	1,800	....	....	5,000	....	....	....	....	....	....
Hungary	3	220,000	122,200	13,200	20,000	23,000	....	....	76,600	....	9,800	4,000	10,800	....	....
India	12	1,058,742	327,570	113,900	133,470	26,690	....	13,800	77,890	....	4,250	9,000	33,733	10.5	715
Indonesia	6	714,200	267,700	92,500	12,600	62,100	100,100	18,000	51,500	600	....	5,000	7,500	130.8	700
Iran	4	530,000	215,200	80,800	....	63,845	93,180	3,120	34,225	....	....	6,000	12,450	70.0	....
Iraq	8	318,500	82,650	....	....	43,500	38,000	100,000	13,000	....	....	10,168	6,715	64.0	....
Ireland	1	56,000	....	....	....	11,000	....	5,500	11,000	....	....	....	....	....	....
Israel	2	180,000	90,000	70,000	20,000	26,000	....	45,000	30,000	....	....	....	3,000	....	....
Italy	19	2,563,100	723,200	388,400	277,400	289,600	55,000	301,900	596,700	38,545	56,300	33,900	127,170	47.4	1,400
Jamaica	1	35,500	2,000	....	....	3,540	....	....	19,600	....	....	....	1,000	....	....
Japan	43	4,566,850	1,675,940	82,800	557,150	533,940	50,950	1,393,200	2,083,660	10,680	56,700	49,680	64,985	934.4	650
Jordan	1	100,000	16,900	....	4,410	8,640	4,230	....	13,860	....	....	....	....	7.9	....
Kenya	1	90,000	1,700	....	....	9,000	....	....	33,000	....	....	....	900	....	....
Korea	5	820,000	33,400	30,000	....	59,450	7,000	21,000	92,800	....	17,630	6,200	15,200	14.4	....
Kuwait	4	628,000	217,000	....	30,000	51,000	159,000	338,100	30,000	....	....	....	....	507.4	....
Lebanon	2	37,000	12,730	....	7,250	7,492	....	7,392	3,100	....	....	....	409	....	....

Survey of operating refineries worldwide (capacities as of Jan. 1, 1988)

Country	No. plants	Crude, b/cd	Charge capacity, b/cd							Production capacity, b/cd				Hydrogen (MMcfd)	Coke (t/d)
			Vacuum distillation	Thermal operations	Catalytic cracking	Catalytic reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alkyla-tion	Aromatics-isomerization	Lubes	Asphalt		
Liberia	1	15,000	1,000	....	....	2,000	....	....	3,300	....	....	....	200	....	....
Libya	3	329,400	3,432	....	....	14,582	....	....	37,226	....	....	....	1,716	....	....
Madagascar	1	16,350	....	....	....	2,600	....	....	5,500	....	....	....	....	....	....
Malaysia	4	212,300	7,150	....	....	21,410	....	....	60,850	....	....	1,700	....	....	....
Martinique	1	12,800	....	....	....	7,410	....	....	8,350	....	....	....	....	....	....
Mexico	9	1,354,000	600,700	82,000	267,000	157,800	18,000	250,000	207,000	3,860	10,594	15,500	....	70.0	260
Morocco	2	154,600	27,400	....	5,600	26,800	....	....	38,600	....	....	2,100	13,700	....	....
Netherlands	7	1,381,000	401,370	151,560	125,500	157,400	30,000	148,200	522,400	11,500	....	11,700	20,500	86.0	....
Netherlands Antilles	1	320,000	158,000	67,000	42,000	15,000	....	....	121,500	5,600	....	8,000	8,000	....	....
New Zealand	1	81,700	38,700	....	....	21,700	20,100	6,000	42,200	....	....	....	2,100	45.0	....
Nicaragua	1	14,500	2,000	....	....	2,800	....	....	10,000	....	....	....	800	....	....
Nigeria	3	270,000	70,200	....	47,000	39,700	....	....	116,380	....	....	4,309	....	....	....
Norway	3	240,000	3,000	86,500	....	29,150	....	32,500	43,500	....	3,000	....	2,000	....	480
Oman	1	76,932	....	....	....	15,386	....	....	19,506	....	....	....	....	....	....
Pakistan	3	130,050	14,200	....	....	5,450	....	....	24,800	....	1,250	3,815	4,050	0.1	....
Panama	1	100,000	14,000	....	....	7,500	....	....	30,000	....	....	....	5,000	....	....
Paraguay	1	7,500	....	....	....	....	....	....	....	....	....	....	....	....	....
Peru	6	182,018	36,915	....	21,305	1,680	....	....	....	....	....	1,080	....	....	....
Philippines	3	286,000	58,600	....	23,100	40,200	....	23,500	92,700	4,400	....	3,400	5,000	....	....
Portugal	3	294,300	53,200	....	10,100	35,400	9,400	46,000	44,400	....	....	3,400	4,600	....	....
Puerto Rico	2	123,000	59,300	....	12,000	5,800	15,000	10,000	15,700	1,000	....	6,800	900	17.0	....
Qatar	1	62,000	....	....	....	12,030	....	....	39,640	....	....	....	....	....	....
Saudi Arabia	7	1,375,000	271,655	27,000	76,000	178,900	65,100	39,000	314,000	12,500	19,400	....	30,500	207.0	....
Senegal	1	29,800	18,800	....	....	2,870	....	....	2,870	....	....	....	....	....	....
Sierra Leone	1	10,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Singapore	5	858,000	256,100	137,700	....	54,300	48,100	83,600	235,400	....	....	12,800	12,000	79.1	....
Somalia	1	10,000	....	....	....	....	....	....	....	....	....	....	....	....	....
South Africa	4	433,500	104,000	63,500	84,400	62,800	18,000	77,300	142,150	7,000	9,400	3,000	6,140	34.0	....
Spain	10	1,305,000	374,800	178,000	143,500	189,100	15,000	190,500	283,000	....	23,720	9,300	55,550	62.6	540
Sri Lanka	1	50,000	2,400	12,500	....	3,750	....	2,100	15,300	....	....	....	1,000	....	....
Sudan	1	21,440	....	....	....	1,700	....	....	7,400	....	....	....	....	....	....
Sweden	5	436,500	125,000	68,000	27,000	72,700	...	92,000	119,500	3,300	4,000	2,500	28,500	1.9	....
Switzerland	2	132,000	24,000	20,000	....	26,000	....	8,000	49,200	....	3,600	....	5,200	....	....
Syria	2	228,790	60,611	41,199	....	19,348	....	26,040	37,863	....	....	....	8,036	9.5	685
Tanzania	1	13,500	....	....	....	3,000	....	....	5,000	....	....	....	....	....	....
Thailand	3	191,860	24,950	9,600	9,250	25,300	....	....	109,600	....	....	....	3,600	4.7	....
Togo	1	20,000	....	....	....	4,400	....	....	7,600	....	....	....	....	....	....
Trinidad	2	300,000	171,000	18,000	25,000	31,000	....	104,500	41,800	2,650	2,800	2,700	2,000	....	....
Tunisia	1	34,000	....	....	....	3,300	....	....	....	....	....	....	....	....	....
Turkey	5	675,595	154,560	4,500	34,100	65,370	....	4,777	184,749	....	....	3,830	23,441	0.4	108
United Kingdom	15	1,802,700	806,090	152,000	392,000	367,500	21,000	115,600	776,590	66,700	70,650	21,600	39,450	78.2	2,150
Uruguay	1	45,000	12,000	....	5,000	3,000	....	....	8,000	....	....	....	3,000	....	....
Venezuela	6	1,201,100	560,600	138,000	193,100	6,000	....	296,100	....	61,250	18,300	7,590	39,800	108.9	100
Virgin Islands	1	545,000	215,000	80,000	....	125,000	....	130,000	290,000	....	45,000	....	....	....	....
Yemen, N.	1	10,000	....	....	....	2,500	....	....	....	....	....	....	....	....	....
Yemen, S.	1	170,000	10,000	....	....	12,000	....	....	....	....	....	....	....	....	....
Yugoslavia	7	607,635	178,759	35,630	52,050	74,612	7,200	21,970	107,878	3,400	18,450	4,900	35,325	14.9	137
Zaire	1	17,000	....	....	....	3,000	....	....	5,000	....	....	....	....	....	....
Zambia	1	23,750	2,280	....	5,040	5,040	....	....	8,100	....	....	....	864	....	....
Total	**410**	**40,862,752**	**13,091,337**	**3,334,349**	**4,582,425**	**4,857,766**	**1,172,210**	**5,241,729**	**10,761,035**	**400,489**	**557,633**	**367,630**	**1,020,372**	**3,353.4**	**14,002**

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd					
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
ABU DHABI	Abu Dhabi National Oil Co.–Ruwais	120,000	47,000	....	....	[2]19,150	[1]27,000	....	[2]34,350 [4]42,630	....	....	....	....	[1]53.0	....
	Umm Al-Nar 2	60,000	....	....	....	[4]10,905	....	....	[2]17,530 [4]5,889	....	....	....	....	....	....
	Total	**180,000**	**47,000**	....	....	**30,055**	**27,000**	....	**100,399**	....	....	....	....	**53.0**	....
ALBANIA	Government-owned refineries at Ballsh, Cerrik, Stalin.														
	Total	**40,000**													
ALGERIA	Sonatrach: Arzew	60,000	6,000	....	....	8,600	....	....	8,600	....	....	2,400	2,400	....	....
	Hassi Messaoud	23,700	....	....	....	2,000	....	....	....	....	....	....	....	....	....
	Maison Carree	58,000	....	....	....	15,000	....	....	15,000	....	....	....	....	....	....
	Skikda	323,000	9,000	....	....	30,000	....	....	....	....	1,900	....	2,900	....	....
	Total	**464,700**	**15,000**	....	....	**55,600**	....	....	**23,600**	....	**1,900**	**2,400**	**5,300**	....	....
ANGOLA	Petrangol SARL–Luanda	**32,100**	**1,900**	....	....	**[1]1,900**	....	**[4]2,800**	**[1-2]3,800**	....	....	....	**950**	....	....
ARGENTINA	Destileria Argentina de Petróleo SA–Lomas de Zamora	2,000	1,500	....	....	....	....	....	....	....	....	....	....	....	....
	Esso SAPA–Campana	94,400	49,800	[5]18,900	[1]24,850	[1]8,300	....	....	[1]8,300	....	....	1,000	....	....	900
	Galvan	17,800	....	[2]6,900	....	....	....	....	....	....	....	....	....	....	....
	Isaura SA–Bahia Blanca	12,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Shell Cia. Argentina de Petróleo SA–Buenos Aires	121,700	54,000	[3]27,000	[1]21,700	[1]10,800	....	....	[2]14,900 [4]7,500	[2]1,700 *500	....	1,400	4,200	....	....
	Yacimientos Petroliferos Fiscales–Campo Duran	32,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Dock Sud	4,000	1,000	....	....	....	....	....	....	....	....	....	....	....	....
	La Plata	216,000	69,500	[5]22,000	[1]45,000	[1]9,000	....	....	[1]9,000 [4]3,000 [6]5,900	[1]1,200 [2]750 *2,700	....	4,150	17,600	....	....
	Lujan de Cuyo	129,000	66,000	[5]30,000	[1]20,900	[1]9,000	[1]23,900	....	[1]4,400	....	....	....	....	[1]19.0	....
	Plaza Huincul	23,000	....	....	....	[2]2,500	....	....	[2]2,500	....	....	....	....	....	....
	San Lorenzo	37,600	16,100	[2]3,500 [3]12,500	....	....	....	....	....	....	....	....	....	....	....
	Total	**689,500**	**257,900**	**120,800**	**112,450**	**39,600**	**23,900**	....	**55,500**	**6,850**	....	**6,550**	**21,800**	**19.0**	**900**
AUSTRALIA	Ampol Refineries Ltd.–Lytton	65,000	25,000	....	[1]26,000	[1]12,600	....	....	[7]5,000	[2]4,000 *1,000	[6]5,600	....	....	....	....
	Australian Lubricating Oil Refinery Ltd.–Kurnell	....	6,900	....	....	....	....	....	[6]6,300	....	....	3,400	....	....	....
	BP Australia–Brisbane	42,000	11,400	....	[1]15,800	[2]8,500	....	....	[4]7,600	[2]1,850	....	....	1,500	....	....
	Kwinana	100,000	43,000	....	[1]24,000	[1]6,400 [2]16,400	....	[4]8,200	[1]12,000	[2]2,400	....	2,600	1,700	....	....
	Caltex Refining CPL–Kurnell[1]	100,000	20,000	....	[1]39,000	[1]25,600	....	....	[1]25,600 [4-5]14,000	[1]2,600 *2,700	....	....	3,000	....	....
	Mobil Oil Australia Ltd.–Adelaide	....	20,000	....	....	....	....	....	....	....	....	4,700	....	....	....

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd					
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
	Petroleum Refineries Australia PL– Adelaide	46,500	....	....	....	^{2}16,000	....	....	^{7}35,000	....	....	....	1,200	....	....
	Altona	98,600	22,000	....	^{2}24,000	^{2}28,000	....	....	^{1}35,000 ^{4}10,000	^{1}2,700	....	....	3,000	....	....
	Shell Refining (Australia) PL.–Clyde	75,000	21,000	....	^{1}31,000	^{2}13,300	....	^{1}7,000	^{4}37,000	^{2}5,000 *3,000	....	....	....	....	....
	Geelong	110,000	10,000	....	^{1}25,000	^{2}8,000 ^{6}20,000	....	^{2}4,000 ^{3}11,000 ^{5}3,500	^{4}55,000	^{2}6,000 *1,500	^{6}8,000	2,500	2,500	....	....
	Total	**637,100**	**179,300**	....	**184,800**	**154,800**	....	**33,700**	**242,500**	**32,750**	**13,600**	**13,200**	**12,900**	....	....
	Solvent extraction: ^{1}4,800 b/cd.														
AUSTRIA	OeMV–Schwechat	204,000	68,000	^{3}17,000	^{1}24,000	^{1}14,000 ^{4}18,000	....	^{2}35,000 ^{4}33,000	^{1}37,000 ^{6}1,300 ^{7}11,000	....	^{6}9,000	2,300	5,850	....	....
	Total	**204,000**	**68,000**	**17.000**	**24,000**	**32,000**	....	**68,000**	**49,300**	....	**9,000**	**2,300**	**5,850**	....	....
BAHRAIN	Bahrain Petroleum Co. BSC (Closed) –Sitra	250,000	144,000	^{3}19,000	^{1}36,000	^{2}17,100	....	^{2}45,000	^{1}17,100 ^{4}18,000	*1,300	....	....	4,500	^{1}26.2	....
	Total	**250,000**	**144,000**	**19,000**	**36,000**	**17,100**	....	**45,000**	**35,100**	**1,300**	....	....	**4,500**	**26.2**	....
BANGLADESH	Eastern Refinery Ltd.–Chittagong	**31,200**	**3,530**	....	....	**^{1}1,650**	....	**^{4}2,430**	**^{1}1,940**	....	....	....	**1,200**	....	....
BARBADOS	Mobil Oil Barbados Ltd.–Bridgetown	**3,000**	....	....	....	....	....	....	....	....	....	....	....	....	....
BELGIUM	Belgian Refining Corp. NV–Antwerp	91,500	45,000	^{3}20,300	....	^{2}12,000	....	$^{1-2}$22,500 ^{5}25,000	....	....	....	....	....	....	....
	Esso Inc.–Antwerp	218,000	108,300	....	^{1}25,500	^{4}38,100	....	^{2}79,200	^{2}44,400 ^{4}71,200	....	....	....	2,000	^{1}46.0	....
	Nynas Petroleum NV—Antwerp	15,000	12,500	....	....	....	....	....	....	....	....	....	12,000	....	....
	SIBP NV–Antwerp	306,000	132,300	^{3}42,500	^{1}76,500	^{2}30,200	....	$^{3-4}$63,400	^{2}67,100	^{2}6,150 *1,560	....	....	11,300	....	....
	Total	**630,500**	**298,100**	**62,800**	**102,000**	**80,300**	....	**190,100**	**182,700**	**7,710**	....	....	**25,300**	**46.0**	....
BOLIVIA	Yacimientos Petroliferos Fiscales Bolivianos–Cochabamba[1]	27,500	2,100	....	....	^{1}7,758	....	....	^{1}7,758 ^{6}455	....	....	500	54	....	....
	Santa Cruz	16,430	....	....	....	^{1}6,400	....	....	^{1}6,400	....	....	....	....	....	....
	Sucre	3,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Total	**46,930**	**2,100**	....	....	**14,158**	....	....	**14,613**	....	....	**500**	**54**	....	....
	[1] Solvent extraction: 166 b/cd.														
BRAZIL	Petróleo Brasileiro SA: Araucária, Paraná	151,000	61,000	....	^{1}47,200	....	....	....	....	....	....	....	....	....	....
	Betim, Minas Gerais	144,600	68,400	....	^{1}34,100	....	....	....	^{2}12,000 ^{5}30,000	....	....	....	....	^{2}5.0	....

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd					
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
	Canoas, Rio Grande do Sul	72,300	36,500	....	[1]15,100	....	....	....	....	....	....	....	....	....	....
	Cubatão, São Paulo	163,600	81,100	[5]25,100	[1]53,400	[1]11,000	....	....	....	....	....	....	8,800	....	1,265
	Duque de Caxias, Rio de Janeiro	226,600	112,500	....	[1]47,200	[1]13,800	....	....	....	....	....	12,500	....	[2]5.0	....
	Fortaleza, Ceará	....	4,700	....	....	....	....	....	....	....	....	....	2,500	....	....
	Manaus, Amazonas	10,000	5,600	....	[1]2,000	....	....	....	....	....	....	....	....	....	....
	Mataripe, Bahia	121,400	63,200	....	[1]27,700	....	....	....	[6]3,300 [7]2,000	....	....	3,500	2,500	[1]1.1	....
	Mauá, Santo André, São Paulo	32,500	10,000	....	[2]18,200	....	....	....	....	....	....	....	....	....	....
	Paulínia, São Paulo	302,000	150,000	....	[1]44,000	....	....	....	....	....	....	....	....	....	....
	São José dos Campos, São Paulo	164,000	100,000	....	[1]59,100	....	....	....	[2]20,100 [5]66,000	....	....	....	....	[2]9.0	....
	Refinaria de Petróleo Ipiranga SA–Rio Grande do Sul	9,300	5,000	....	[1]2,500	....	....	....	....	....	....	....	....	....	....
	Refinaría de Petroleos de Manguinhos SA–Rio de Janeiro	10,000	....	[2]4,300 [3]4,400	....	....	....	....	....	....	....	....	....	....	....
	Total	**1,407,300**	**698,000**	**33,800**	**350,500**	**24,800**	....	....	**133,400**	....	....	**16,000**	**13,800**	**20.1**	**1,265**
BRUNEI	Brunei Shell Petroleum CL–Seria	**10,000**	....	....	....	....	....	....	....	....	....	....	....	....	....
BULGARIA	Government-owned refineries at Burgas, Pleven, Ruse.														
	Total	**300,000**													
BURMA	Petrochemical Industries Corp.–Chauk	6,300	2,500	....	....	....	....	....	....	....	....	....	....	....	....
	Syriam	20,000	2,300	[2]1,700	....	....	....	....	....	....	....	....	....	....	40
	Total	**26,300**	**4,800**	**1,700**	....	....	....	....	....	....	....	....	....	....	**40**
CAMEROON	Sonara–National Refining CL–Cape Limboh, Limbe	**43,000**	....	....	....	**[2]6,500**	....	**[4]10,000**	**[1]10,000**	....	....	....	....	....	....
CANADA **Alberta**	Husky Oil Operations Ltd.–Lloydminster	23,500	15,000	....	....	....	....	....	....	....	....	....	12,000	....	....
	Imperial Oil Ltd.–Edmonton	164,900	66,100	....	[1]47,000	[4]20,900	....	[4]15,000	[2]51,000	[2]12,200	[4]6,700	3,200	5,800	....	....
	Petro-Canada Products Inc.–Edmonton	121,100	27,000	[5]7,100	[1]36,000	[2]12,600	[4]18,200	....	[5]6,600 [7]46,600	[2]9,500	[4]3,000	....	....	[1]30.8	431
	Shell Canada Ltd.–Scotford	56,000	....	....	....	[8]18,450	[1]36,000	....	[1]18,450 [4]17,550	....	[1]9,900 [2]5,400 [3]270	....	....	[1]50.0	....
	Turbo Resources Ltd.–Balzac	27,500	6,950	....	[1]8,800	[2]7,550	....	....	[2]7,550 [4]7,550 [7]15,300	*1,035	....	....	....	....	....
	Total	**393,000**	**115,050**	**7,100**	**91,800**	**59,500**	[illegible]	**15,000**	**170,600**	**22,735**	**25,270**	**3,200**	**17,800**	**80.8**	**431**
British Columbia	Chevron Canada Ltd.–North Burnaby	35,000	11,200	....	[1]10,000	[2]10,500	....	....	[1]10,500	[1]2,000 *650	....	....	2,200	....	....
	Husky Oil Operations Ltd.–Prince George	9,500	3,800	....	[1]3,300	[2]1,400	....	....	[7]6,900	....	....	....	1,300	....	....
	Imperial Oil Ltd.–Ioco	42,800	20,900	....	[1]12,100	[3]6,700	....	....	[2]6,700 [4]5,700 [5]5,700	*1,200	....	....	700	....	....

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd					
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
	Petro-Canada Products Inc.– Port Moody	37,200	11,200	....	[1]12,300	[2]8,600	....	....	[1]15,400 [4]14,100	[1]1,400	....	....	....	....	....
	Taylor	19,000	1,600	....	[1]6,300	[2]3,000	....	....	[1]4,000 [4]7,200	[3]1,000	....	....	500	....	....
	Shell Canada Ltd.–Shellburn, Burnaby	24,000	6,650	....	[1]5,400	[2]2,430	....	....	[2]5,400 [4]9,900	*720	....	....	2,250	....	....
	Total	**167,500**	**55,350**	....	**49,400**	**32,630**	....	....	**91,500**	**6,970**	....	....	**6,950**	....	....
New Brunswick	Irving Oil Ltd.–St. John	237,500	61,750	[3]18,000	[1]17,100	[2]34,650	[1]29,700	....	[1]45,450 [4]40,500	*1,710	....	....	11,700	[2]40.0	....
	Total	**237,500**	**61,750**	**18,000**	**17,100**	**34,650**	**29,700**	....	**85,950**	**1,710**	....	....	**11,700**	**40.0**	....
Newfoundland	Newfoundland Processing Ltd.– Come By Chance	105,000	50,000	....	....	[2]26,000	[1]35,000	....	[2]26,000 [5]18,000	....	....	....	....	....	....
	Total	**105,000**	**50,000**	....	....	**26,000**	**35,000**	....	**44,000**	....	....	....	....	....	....
Northwest Territories	Imperial Oil Ltd.–Norman Wells	**2,900**	....	....	....	....	....	....	....	....	....	....	....	....	....
Nova Scotia	Imperial Oil Ltd.–Dartmouth	82,300	39,800	....	[1]22,600	[4]8,600	....	....	[1]8,600 [4]25,700 [5]8,600	*2,600	....	....	3,900	[1]1.7	....
	Texaco Canada Ltd.–Halifax	20,000	8,600	....	[1]7,200	[2]3,600	....	[4]5,200	[1]3,600	....	....	....	....	....	....
	Total	**102,300**	**48,400**	....	**29,800**	**12,200**	....	**5,200**	**46,500**	**2,600**	....	....	**3,900**	**1.7**	....
Ontario	Imperial Oil Ltd.–Sarnia	123,500	28,500	[4]16,800	[1]23,000	[2]17,100 [4]13,300	[1]8,900	....	[2]32,300 [4]13,300 [5]24,700	[2]6,800 *3,000	....	6,200	....	[1]20.9	....
	Petro-Canada Products Inc.–Clarkson	60,000	35,500	....	....	[6]9,800	[3]10,300	....	[1]10,300 [4]7,800	....	....	4,900	4,600	[1]13.3	....
	Oakville	80,500	41,000	....	[1]25,400	[1]5,000 [2]11,500	....	....	[1]19,500 [4]6,300	[1]3,100	....	....	9,500	....	....
	Shell Canada Ltd.–Sarnia	71,000	24,700	[3]4,050	[1]14,400	[2]20,970	[1]6,750	....	[1]15,030 [5]6,300	*1,620	[1]2,700	....	....	....	....
	Suncor Inc.–Sarnia	70,000	15,000	[3]5,200	[2]16,000	[2]26,000	[2]18,600	[4]3,700	[1]25,600	[2]4,100	[1]7,400	....	....	[1]38.0	....
	Texaco Canada Ltd.–Nanticoke	95,000	31,000	....	[1]40,000	[6]24,000	....	....	[1]24,000	[1]7,400	....	....	....	....	....
	Total	**500,000**	**175,700**	**26,050**	**118,800**	**127,670**	**44,550**	**3,700**	**185,130**	**26,020**	**10,100**	**11,100**	**14,100**	**72.2**	....
Quebec	Petro-Canada Products Inc.–Montreal	87,400	40,700	[3]12,600	[1]14,900	[2]31,300	[4]14,400	....	[1]26,600 [4]9,000	[1]2,300 *800	[1]8,700 [2]2,400	....	14,300	[1]42.8	....
	Shell Canada Ltd.–Montreal	120,000	49,400	[3]8,100	[1]21,150	[2]20,700	[1]11,700	....	[2]27,900 [4]32,400	[2]1,400	....	3,060	7,200	....	....
	Ultramar Canada Inc.–St. Romuald	100,000	33,000	....	[1]30,000	[2]15,000	....	....	[1]15,000 [4]12,000	*2,650	....	....	30,000	....	....
	Total	**307,400**	**123,100**	**20,700**	**66,050**	**67,000**	**26,100**	....	**122,900**	**7,150**	**11,100**	**3,060**	**51,500**	**42.8**	....

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd: Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Production capacity, b/cd: Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
Saskatchewan	Consumers' Cooperative Refineries Ltd.–Regina	40,000	18,000	[5]6,300	[1]12,600	[1]9.000	....	....	[1]9,000	*4,400	....	....	....	....	360
	Petro-Canada Products Inc.–Moose Jaw	13,300	7,300	....	....	....	....	....	....	....	....	5,500	....	....	....
	Total	**53,300**	**25,300**	**6,300**	**12,600**	**9,000**	**....**	**....**	**9,000**	**4,400**	**....**	**5,500**	**....**	**....**	**360**
	Total Canada	**1,668,900**	**654,650**	**78,150**	**385,550**	**368,650**	**189,550**	**23,900**	**755,580**	**71,585**	**46,470**	**22,860**	**105,950**	**237.5**	**791**
CHILE	Petrox SA–Talcahuano	72,000	40,000	[3]8,400	[1]17,000	....	....	....	....	....	....	....	....	....	....
	Refineria de Concón–Concón	69,000	39,000	[3]10,000	[1]20,000	[1]5,300	....	....	[2]5,300	[1]1,000	....	....	....	....	....
	Total	**141,000**	**79,000**	**18,400**	**37,000**	**5,300**	**....**	**....**	**5,300**	**1,000**	**....**	**....**	**....**	**....**	**....**
CHINA	Government-owned refineries at Anshan, Beijing, Dalian, Daqing, Fushun, Hangzhou, Jinxi, Karamai-Dushanzi, Lanchow, Lenghu, Maoming, Nanchong, Nanjing, Shanghai, Shengli, Tianjin, Yumen.														
	Total	**2,200,000**													
CHINA, TAIWAN	Chinese Petroleum Corp.–Kaohsiung	470.000	87,500	[5]15,000	[1]25,000	[2]20,000 [6]20,000	[1]20,000	[1]30,000 [2]35,000 [3]25,000 [4]15,000	[1]45,000 [2]3,500	[2]3,500	[1]14.983 [2]1,222 [3]1,222	....	11,181	[2]50.0 [5]45.0	920
	Tao-Yuan	130,000	36,000	....	....	[2]22,500	....	[1]30,000 [2]20,000	[1]22,500 [4]16,000	....	....	....	....	[2]10.0	....
	Total	**600,000**	**123,500**	**15,000**	**25,000**	**62,500**	**20,000**	**155,000**	**87,000**	**3,500**	**17,427**	**....**	**11,181**	**105.0**	**920**
COLOMBIA	Empresa Colombiana de Petróleos –Barrancabermeja-Santander[1]	150,000	80,000	[3]40,000	[1]62,000	[2]6,000	....	....	[1]6,000 [3]540 [5]22,000 [6]4,300 [7]1,400	[1]3,000 [2]500 *2,000	[1]3,300 [2]1,100 [3]700	2,300	2,400	[1]21.0	....
	Cartagena, Bolivar	70,000	40,000	[3]20,000	[1]29,000	....	....	....	....	*5,800	....	....	....	....	....
	Orito, Putumayo	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Tibu, N. de Santander	5,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Total	**226,000**	**120,000**	**60,000**	**91,000**	**6,000**	**....**	**....**	**34,240**	**11,300**	**5,100**	**2,300**	**2,400**	**21.0**	**....**
	Solvent extraction: [1]35,000 b/cd.														
CONGO	Coraf–Pointe-Noire	**21,000**	**8,000**	**....**	**....**	**[2]2,000**	**[1]2,000**	**....**	**[4]3,500**	**....**	**....**	**....**	**....**	**....**	**....**
COSTA RICA	Refinadora Costarricense de Petroleo SA–Limón	16,200	600	[2]6,500	....	[2]1,200	....	....	[1]1,200 [4]2,200	....	....	....	300.	....	....
	Total	**16,200**	**600**	**6,500**	**....**	**1,200**	**....**	**....**	**3,400**	**....**	**....**	**....**	**300**	**....**	**....**
COTE d'IVOIRE	Ste. Ivoirienne de Raffinage–Abidjan	50,000	34,500	....	....	[2]16,600	[1]11,500	11,500	[4]21,000	....	....	....	....	....	....
	Ste. Multinationale de Bitumes–Abidjan	10,000	7,500	....	....	....	....	....	....	....	....	....	6,000	....	....
	Total	**60,000**	**42,000**	**....**	**....**	**16,600**	**11,500**	**11,500**	**21,000**	**....**	**....**	**....**	**6,000**	**....**	**....**

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Production capacity, b/cd Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
CUBA	Government-owned refineries at Cabaiguan, Havana, Santiago de Cuba.														
	Total	**160,000**													
CYPRUS	Cyprus Petroleum Refinery Ltd.– Larnaca	**16,000**	**1,800**	....	....	**[2]3,400**	....	....	**[4]6,000**	....	....	....	**700**	....	....
CZECHO-SLOVAKIA	Government owned refineries at Bratislava, Kolin, Kralupi, Pardubice, Strazke, Zaluzi, Zyolen.														
	Total	**455,000**													
DENMARK	AS Dansk Shell–Fredericia	55,000	....	[2]22,000	....	[2]12,000	....	[2]10,000	[2]19,000	....	[6]3,400	....	....	....	....
	Statoil AS–Kalundborg	65,000	22,000	[3]28,000	....	[2]8,600	....	....	[1]8,600 [5]11,400	....	....	....	8,000	....	....
	Kuwait Petroleum Refining (Danmark) A/S–Gulfhavn	57,000	19,050	[2]10,900 [3]9,770	....	[2]10,500	....	....	[2]22,300 [4-5]22,900	....	....	....	....	....	....
	Total	**177,000**	**41,050**	**70,670**	....	**31,100**	....	**10,000**	**84,200**	....	**3,400**	....	**8,000**	....	....
DOMINICAN REPUBLIC	Falconbridge Dominicana C por A–La Peguera	16,000	....	....	....	....	....	....	[2]6,200	....	....	....	....	[2]0.4	....
	Refineria Dominicana de Petróleo SA–Haina	32,500	....	....	....	[1]7,900	....	....	[4]15,000	....	....	....	....	....	....
	Total	**48,500**	....	....	....	**7,900**	....	....	**21,200**	....	....	....	....	**0.4**	....
ECUADOR	CEPE–Esmeraldas	90,000	43,020	[3]25,200	[1]16,000	[2]2,780	....	....	....	....	....	....	....	....	....
	Anglo Ecuadorian Oilfields Ltd.– Sta. Elena Peninsula	31,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Texaco–Lago-Agrio	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Total	**122,000**	**43,020**	**25,200**	**16,000**	**2,780**	....	....	....	....	....	....	....	....	....
EGYPT	Alexandria Petroleum Co.–Alexandria (El-Mex)	99,250	22,500	....	....	....	....	....	[6]1,436 [7]76	....	603 281	1,436	2,010	[1]1.0	1
	Cairo Oil Refining Co.–Mostorod	125,060	....	....	....	[2]9,000	....	....	[1]11,700 [4]14,400	....	....	....	....	....	....
	Tanta	21,800	....	....	....	....	....	....	....	....	....	....	....	....	....
	El Ameria Oil Refining Co.– Alexandria	60,340	14,725	....	....	[2]9,400	....	....	[1]12,000 [4]14,400 [6]1,608	[2]804	[1]86 [1]482	1,407	2,010	[1]1.0	....
	El-Nasr Petroleum Co.–El-Suez	73,450	....	....	....	....	....	....	....	....	....	....	2,613	....	....
	Wadi-Feran	9,680	....	....	....	....	....	....	....	....	....	....	....	....	....
	Suez Oil Processing Co.–El-Suez	62,530	9,500	[5]16,470	....	[2]12,540	....	....	[1]16,660 [4]10,800 [6]1,306	....	....	1,005	....	[5]3.5	540
	Total	**452,110**	**46,725**	**16,470**	....	**30,940**	....	....	**84,386**	**804**	**1,452**	**3,848**	**5,633**	**5.5**	**541**

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd				Hydrogen, MMcfd	Coke, tons/day
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt		
El SALVADOR	Refinería Petrólera Acajutla SA–Acajutla	17,000	1,900	....	....	[1]3,800	....	....	[2]5,600 [4]6,500	....	....	....	600	....	....
	Total	**17,000**	**1,900**	....	....	**3,800**	....	....	**12,100**	....	....	....	**600**	....	....
ETHIOPIA	Ethiopian Petroleum Corp.–Assab	**18,000**	**1,600**	....	....	**[1]2,200**	....	....	**[1]4,100**	....	....	....	**570**	....	....
FINLAND	Neste Oy–Naantali	44,000	13,700	[3]7,100	[2]13,300	[5]6,800	....	[4]21,800	[2]6,700 [7]240	*280	....	....	3,000	....	....
	Porvoo	197,000	67,700	[3]39.200	[1]28,500	[5]36,100	[1]14,200	[4]82,700	[2]51,000	*3,500	....	....	4,600	[1]20.0	....
	Total	**241,000**	**81,400**	**46,300**	**41,800**	**42,900**	**14,200**	**104,500**	**57,940**	**3,780**	....	....	**7,600**	**20.0**	....
FRANCE	CRD—Total France–Gonfreville L'Orcher[1]	309,000	73,000	[3]16,600	[1]30,100	[2]45,400	....	[3]59,600 [5]9,000	[1]45,400 [2]71,600	*925	[1]1,500	7,400	20,250	....	....
	La Mède	136,000	47,500	[3]20,850	[1]29,700	[4]23,400	....	[3]49,100 [5]7,800	....	[2]2,400	....	....	16,200	....	....
	Mardyck	122,000	41,600	....	[1]24,200	[4]20,500	....	[3]24.500	[2]37,500	....	....	....	....	....	....
	Cie. Rhénane de Raffinage–Reichstett-Vendenheim	85,000	36,000	[2-3]16,000	[1]14,000	[2]13,000	....	[2]12,000	[2]21,000	....	....	....	....	....	....
	Elf France–Donges	200,000	91,000	[3]27,300	[1]41,500	[2]27,300	....	....	[1]35,600 [4-5]45,800	[2]3,700	[6]4,300	....	....	....	....
	Feyzin	170,800	32,000	[3]14,200	[1]21,100	[2]8,400	....	....	[1]8,700 [4-5]28,900	....	[1]5,000	....	....	....	....
	Grandpuits	97,900	51,000	[3]12,800	[1]27,200	[2]12,700	....	....	[1]23,500 [4-5]29,400	[2]2,900	....	....	....	....	....
	Esso SAF–Fos sur Mer	100,000	23,000	....	[1]17,000	[1]16,000	....	....	[4]48,000	....	....	7,000	....	....	....
	Port Jerome	136,000	56,000	....	[1]20,000	[1]16,000	....	....	[4]36,000	....	....	....	....	....	....
	Mobil Oil Francaise–Notre Dame de Gravenchon	57,000	36,500	....	....	[2]13,300	....	....	[1]13,000 [4]13,000	....	....	5,500	1,500	....	....
	Shell Francaise–Berre l'Etang	128,000	60,000	[3]23,000	[1]19,000	[2]15,000	....	[2]35,000	[2]33,000	....	....	....	....	....	....
	Petit Couronne	217,000	113,000	[3]10,000	[1]19,000	[2]42,000	....	[2]33,000	[2]48,000	....	....	7,500	8,000	....	....
	Ste. Francaise des Petroles BP–Dunkirk	....	18,000	....	....	....	....	....	....	....	....	4,200	....	....	....
	Lavera	181,900	....	[3]22,800	[1]26,000	[1]5,700	[1]13,500	[4]32,300	[5]14,000	....	[1]4,300	....	2,700	[1]28.0	....
	Total	**1,940,600**	**678,600**	**163,550**	**288,800**	**258,700**	**13,500**	**262,300**	**552,400**	**9,925**	**15,100**	**31,600**	**48,650**	**28.0**	....
GABON	Ste. Gabonaise de Raffinage–Port Gentil	**23,000**	....	**[3]7,200**	....	**[3]1,500**	....	....	**[4]6,000**	....	....	....	....	....	....
GERMANY, E.	Government-owned	**470,000**													
GERMANY, WEST	Deutsche BP-Erdol Ingolstadt–Vohburg†	102,000	35,300	....	[1]17,200	[1]17,200	....	[4]14,000	[4]28,000	....	....	....	5,500	....	....
	Deutsche Marathon Petroleum GmbH–Burghausen	70,000	....	[6]26,000	....	....	....	....	[5]18,000	....	[1]2,200	....	....	....	....
	Deutsche Shell AG–Godorf	170,000	73,000	[2]29,000 [3]7,000	....	[2]17,000 [6]21,000	[1]19,000	[2]32,000	[2]52,000 [3]34,000 [4]12,000	....	[1]14,000 [2]3,000 [6]6,000	....	12,000	....	....

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[1]Solvent extraction: 9,800 b/cd.

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd				Hydrogen, MMcfd	Coke, tons/day
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/isomerization	Lubes	Asphalt		
	Harburg-Grasbrook	86,000	45,000	^{3}14,000	^{1}15,000	^{6}16,000	....	^{2}14,000 ^{5}6,000	^{2}31,000 ^{3}2,000	....	....	6,100	7,000	....	....
	Deutsche Texaco AG–Heide	80,000	34,000	^{3}16,000	^{2}9,000	^{6}18,000	....	^{4}29,000	^{1}26,000	*300	^{1}7,000	....	3,500	....	....
	Erdol Raffinerie Duisburg GmbH–Duisburg	37,800	11,300	....	....	^{2}7,300	....	^{4}4,200	$^{1\text{-}2}$7,300	....	....	....	....	....	....
	Erdoel Raffinerie Neustadt GmbH–Neustadt-Donau	144,000	65,400	^{3}15,300	^{1}22,700	^{1}17,700	....	^{4}27,200	^{1}22,500	....	....	....	5,400	....	....
	Esso AG–Ingolstadt	95,000	31,400	....	^{1}19,800	^{2}12,800	....	....	^{2}20,400 ^{4}47,400	....	....	....	7,400	....	....
	Karlsruhe	150,000	46,700	^{2}28,000 ^{3}23,000 ^{5}13,900 ^{6}1,900	....	^{2}27,900	....	....	^{2}43,000 ^{5}73,000	....	....	....	10,000	....	....
	Mobil Oil AG–Worth	93,000	23,000	....	^{1}19,000	^{2}15,900	....	....	^{1}28,000 ^{5}26,000	....	....	....	5,000	....	....
	Oberrheinische Mineralolwerke GmbH–Karlsruhe	142,000	102,000	^{3}26,000	^{1}66,000	^{4}11,400 ^{6}20,100	....	^{3}45,900 ^{4}24,600	^{1}37,400	^{2}8,500	....	....	11,800	....	....
	Ruhr Oel GmbH–Gelsenkirchen	215,400	48,200	^{3}16,000 ^{5}28,000	^{1}6,000	^{1}11,900 ^{6}27,000	^{1}30,000	^{4}63,000	^{1}53,000	....	^{1}10,620 ^{2}2,150 ^{3}2,420	....	5,800	^{5}25.0	1,200
	Union Rheinische Braunkohlen Kraftstoff AG–Wesseling	95,000	71,000	^{3}27,000	....	^{4}14,000	^{1}28,000	^{4}16,000	^{1}14,000 ^{2}16,000 ^{3}15,000	*2,500	^{1}6,000	....	....	^{1}32.0 ^{3}42.0 ^{4}17.0	....
	Wintershall AG–Lingen	91,400	28,900	^{5}15,300	....	^{1}7,400 ^{2}11,100 ^{4}15,000	^{1}19,200	^{4}21,300	^{1}18,400 ^{2}2,500	....	^{1}500 ^{2}900 ^{3}2,200	....	3,400	^{1}40.0	420
	Mannheim	71,100	....	....	....	^{2}18,400	....	^{4}29,500	^{1}18,400 ^{3}5,500	....	^{1}2,650 ^{2}2,650 ^{5}2,800	....	....	....	....
	Salzbergen	5,100	4,600	....	....	....	...	....	^{6}1,350	....	....	2,900	900	^{1}0.5	....
	Total	**1,647,800**	**619,800**	**286,400**	**174,700**	**307,100**	**96,200**	**326,700**	**652,150**	**11,300**	**65,090**	**9,000**	**77,700**	**156.5**	**1,620**

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†Operating on a semi-integrated basis.

WORLDWIDE REFINING	Company and refinery location	Crude	Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/day
GHANA	Ghanaian Italian Petroleum CL–Tema	**28,000**	....	....	....	**^{1}5,550**	....	....	....	....	....	....	....	....	....
GREECE	Hellenic Aspropyrgos Refinery SA–Aspropyrgos	110,000	51,000	^{3}21,600	^{1}23,300	^{2}5,200 ^{2}9,500 ^{6}20,000	....	^{2}15,600 ^{3}25,500	^{2}24,200	*1,300	....	....	....	^{5}9.1	....
	Motor Oil (Hellas) Corinth Refineries SA–Aghii Theodori	100,000	59,000	^{3}19,520	^{1}27,200	^{1}8,500	....	....	^{1}11,800 ^{5}25,800 ^{6}3,100	^{2}2,400 *2,000	^{6}4,250	3,100	2,800	....	....
	Petrola Hellas SA–Elefsis	108,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Thessaloniki Refining Co. AE–Thessaloniki	66,500	8,100	....	....	^{2}8,100	....	....	^{2}16,500 ^{4}18,800	....	....	....	2,800	....	....
	Total	**384,500**	**118,100**	**41,120**	**50,500**	**51,300**	....	**41,100**	**100,200**	**5,700**	**4,250**	**3,100**	**5,600**	**9.1**	....

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Production capacity, b/cd Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
GUATEMALA	Texas Petroleum Co.–Escuintla	16,000	....	....	....	^{2}3,000	....	....	^{1}3,000 ^{4}2,000	....	....	....	....	....	....
	Total	**16,000**	....	....	....	**3,000**	....	....	**5,000**	....	....	....	....	....	....
HONDURAS	Refinería Texas de Honduras SA–Puerto Cortes	14,000	....	....	....	^{1}1,800	....	....	^{1}3,000 ^{4}2,000	....	....	....	....	....	....
	Total	**14,000**	....	....	....	**1.800**	....	....	**5,000**	....	....	....	....	....	....
HUNGARY	Dunai KV–Százhalombatta	150,000	86,200	^{3}13,200	^{1}20,000	^{2}23,000	....	....	^{1}23,000 ^{4}35,000 ^{6}2,200	....	^{1}7,100 ^{6}2,700	4,000	6,300	....	....
	Tiszai KV–Leninváros	60,000	30,000	....	....	....	....	....	^{4}16,400	....	....	....	....	....	....
	Zalai KV–Zalaegerszeg	10,000	6,000	....	....	....	....	....	....	....	....	....	4,500	....	....
	Total	**220,000**	**122,200**	**13,200**	**20,000**	**23,000**	....	....	**76,600**	....	**9,800**	**4,000**	**10,800**	....	....
INDIA	Bharat Petroleum CL–Mahul, Bombay	140,000	42,500	....	^{1}31,000	^{1}5,200	....	....	....	....	^{1}2,500 ^{1}375	....	1,000	....	....
	Bongaigaon Refinery & Petrochemicals Ltd.–Bongaigaon, Assam	27,392	....	^{2}10,400	....	^{2}1,930	....	....	....	....	....	....	....	....	....
	Cochin Refineries Ltd.–Kerala	90,000	34,270	^{3}22,830	^{1}19,100	^{1}5,660	....	....	^{2}11,690 ^{4}22,900	....	....	....	6,020	....	....
	Hindustan Petroleum CL–Mahul, Bombay[1]	120,000	55,000	....	^{1}12,000	....	....	....	^{6}8,000	....	....	....	5,000	^{1}1.0	....
	Visakhapatnam	90,000	34,000	....	^{1}20,000	....	....	....	....	....	....	....	1,000	....	....
	Indian Oil CL–Barauni	66,000	15,000	^{5}20,170	....	....	....	....	....	....	....	....	....	....	525
	Digboi	10,050	....	^{5}800	....	....	....	....	....	....	....	1,200	513	....	40
	Gauhati	60,400	....	^{5}5,500	....	....	....	....	....	....	....	....	....	....	150
	Gujarat	165,200	47,000	^{3}18,900	^{1}19,800	^{3}7,000	....	....	....	....	^{1}1,375	....	4,300	....	....
	Haldia	55,000	20,000	^{3}8,500	....	^{1}4,500	....	^{4}13,800	^{6}3,800	....	....	3,600	3,500	....	....
	Mathura	120,000	43,000	^{3}18,900	^{1}19,800	....	....	....	....	....	....	....	8,600	....	....
	Madras Refineries Ltd.–Madras	114,700	36,800	^{2}4,900 ^{3}3,000	^{1}11,770	^{1}2,400	....	....	^{1}2,400 ^{4}25,100 ^{6}4,000	....	....	4,000	3,800	^{1}9.5	....
	Total	**1,058,742**	**327,570**	**113,900**	**133,470**	**26,690**	....	**13,800**	**77,890**	....	**4,250**	**9,000**	**33,733**	**10.5**	**715**
INDONESIA	Pertamina–Balikpapan, Kalimantan	221,500	84,800	....	....	^{6}18,000	^{1}49,700	....	^{1}18,000	....	....	....	....	^{1}60.0	....
	Cilacap, Central Java	271,200	30,700	^{3}49,900	....	^{1}12,600 ^{6}18,000	....	^{4}18,000	^{1}18,100	....	....	5,000	7,500	....	....
	Dumai, Central Sumatra	99,400	83,500	^{5}31,800	....	^{1}5,800 ^{6}7,900	^{1}50,400	....	^{1}6,300 ^{3}9,100	....	....	....	....	^{1}70.8	700
	Musi, South Sumatra	81,400	68,700	^{2}10,800	^{1}12,600	...	....	....	....	^{1}300 *300	....	....	....	....	....
	Pangakalan Brandan, North Sumatra	4,500	....	....	....	....	....	....	....	....	....	....	....	....	....
	Sungai Pakning, Central Sumatra	36,200	....	....	....	....	....	....	....	....	....	....	....	....	....
	Total	**714,200**	**287,700**	**92,500**	**12,600**	**62,100**	**100,100**	**18,000**	**51,500**	**600**	....	**5,000**	**7,500**	**130.8**	**700**

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[1] Solvent extraction: 10,000 b/cd.

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd				Hydrogen, MMcfd	Coke, tons/ day
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics/ Isomerization	Lubes	Asphalt		
IRAN	National Iranian Oil Co.–Esfahan	200,000	96,800	[3]38,000	....	29,600	[1]30,000	....	29,000	....	....	....	5,450	70.0	....
	Shiraz	40,000	18,400	[3]8,800	....	6,245	[1]9,380	3,120	5,225	....	....	....	....	....	....
	Tabriz	80,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Tehran	210,000	100,000	[3]34,000	....	28,000	[1]26,000 [2]27,800	....	....	....	....	6,000	7,000	....	....
	Total	**530,000**	**215,200**	**80,800**	....	**63,845**	**93,180**	**3,120**	**34,225**	....	....	**6,000**	**12,450**	**70.0**	....
	Note: Present status uncertain due to Iran-Iraq war.														
IRAQ	Oil Refineries Administration–Baiji	150,000	65,000	....	....	22,000 16,500	38,000	31,000 28,000 41,000	....	....	...	....	....	64.0	....
	Basra	70,000	17,650	....	....	....	....	....	....	....	....	2,008	....	....	....
	Daura	71,000	....	....	....	5,000	....	....	13,000	....	....	8,160	1,815	....	....
	K3-Haditha	7,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Khanaqin	12,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Mufthia	4,500	....	....	....	....	....	....	....	....	....	....	....	....	....
	Qaiyarah, Mosul	2,000	....	....	....	....	....	....	....	....	....	....	4,900	....	....
	Iraqi Company for Oil Operations–Kirkuk	2,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Total	**318,500**	**82,650**	....	....	**43,500**	**38,000**	**100,000**	**13,000**	....	....	**10,168**	**6,715**	**64.0**	....
	Note: Present status uncertain due to Iran-Iraq war.														
IRELAND	Irish Refining plc–Whitegate	**56,000**	....	....	....	**[4]11,000**	....	**[4]5,500**	**[2]11,000**	....	....	....	....	....	....
ISRAEL	Oil Refineries Ltd.–Ashdod	70,000	35,000	[3]25,000	....	[2]10,000	....	[4]25,000	[1]15,000	....	....	....	....	....	....
	Haifa	110,000	55,000	[3]45,000	[1]20,000	[2]16,000	....	[4]20,000	[1]15,000	....	....	....	3,000	....	....
	Total	**180,000**	**90,000**	**70,000**	**20,000**	**26,000**	....	**45,000**	**30,000**	....	....	....	**3,000**	....	....
ITALY	Agip Raffinazione–Rho, Milan	79,800	29,900	....	[2]13,700	[2]16,000	....	[4]12,700	[2]21,600	[2]1,845	....	1,700	7,000	[5]14.3	....
	Sannazzaro, Pavia	210,000	64,500	....	[1]27,000	[2]10,000 [6]16,700	....	[4]41,000	[1]9,800 [2]27,000	[2]3,200	....	....	....	....	....
	Taranto	90,900	13,300	[6]40,900	....	[2]16,000	....	[4]12,100 [5]19,600	[7]23,400	....	....	....	2,500	[2]11.3	....
	ANIC SpA–Gela	80,000	32,000	[4]29,500	[1]34,000	[2]10,000	....	[4]25,000	[2]7,000	[2]9,000	[2]800 [4]4,000	....	....	....	1,400
	Anonima Petroli Italiana–Falconara, Marittima	78,900	13,000	[2]4,500 [3]31,000	....	[2]10,500	....	....	[1]18,900 [4]26,900	....	....	....	....	[5]3.8	....
	ERG SpA–Genoa, San Quirico	130,000	....	[3]38,500	....	[2]10,500	....	....	[1]10,500 [2]4,200 [4]29,000	....	....	....	....	....	....
	Esso Italiana SpA–Augusta, Siracusa	180,000	94,000	....	[1]45,300	[2]9,300 [4]7,300	....	....	[1]16,600 [4]26,300 [6]23,000	[2]9,100	[4]5,300	16,900	11,500	....	....
	Industrie Chimiche Italiane de Petrolio SpA–Frassino, Mantova	55,000	18,000	[2]9,000 [3]22,000	....	[2]9,500	....	....	[1]12,000 [4]7,000 [5]8,000	....	[6]2,500	....	....	....	....
	Iplom SpA–Busalla	46,500	12,600	[3]13,100	....	....	....	....	....	....	....	6,500	5,000	....	....
	Irom–Industria Raffinazione Oli Minerali–Porto Marghera	90,000	11,000	[3]25,000	....	[2]11,000	....	[4]20,000	[2]11,000	....	[5]6,000	....	7,400	....	....

WORLDWIDE REFINING			Charge capacity, b/cd							Production capacity, b/cd					
	Company and refinery location	Crude	Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
	Isab–Melilli	220,000	110,000	^{2}15,000 ^{3}39,000	....	^{3}34,500	^{1}55,000	^{4}54,000	^{2}59,000	....	^{6}15,000	....	....	^{2}18.0	....
	Mediterranea SpA–Milazzo	160,000	72,000	....	^{1}28,000	^{3}10,000	....	....	^{1}10,000	^{1}3,600	....	....	....	....	....
	Mobil Oil Italiana SpA–Naples	100,000	22,500	7,500	^{2}18,400	^{2}12,500	....	....	^{1}12,500 ^{5}12,000	^{2}3,500	....	....	650	....	....
	Raffineria di Roma SpA–Rome	80,500	11,300	^{3}28,400	....	^{2}14,200	....	^{2}17,000	^{2}19,900	....	^{4}5,200	....	9,620	....	....
	Saras SpA–Sarroch	285,000	107,500	^{3}27,000	^{1}63,000	^{6}27,000	....	....	^{1}27,000 ^{4}60,000	^{2}6,800	....	....	....	....	....
	Sarpom–Trecate, Novara	241,500	25,600	....	^{1}16,600	^{2}18,900 ^{4}8,900	....	^{4}38,000	^{2}69,700	*1,500	....	....	80,000	....	....
	Selm-Soc. Energia Montedison–Priolo	240,000	50,000	^{3}25,000	^{1}31,400	^{2}9,000	....	^{4}18,000	^{1}10,000	....	^{1}12,400 ^{2}1,500	....	....	....	....
	Stanic–Livorno	100,000	36,000	....	....	^{2}17,600	....	^{4}31,700	^{1}20,000	....	....	8,800	3,500	....	....
	Tamoil Italia SpA–Cremona	95,000	....	^{3}33,000	....	^{1}3,800 ^{2}6,400	....	^{4}12,800	^{2}14,400	....	^{6}3,600	....	....	....	....
	Total	**2,563,100**	**723,200**	**388,400**	**277,400**	**289,600**	**55,000**	**301,900**	**596,700**	**38,545**	**56,300**	**33,900**	**127,170**	**47.4**	**1,400**
JAMAICA	Petrojam Ltd.–Kingston	35,500	2,000	....	....	^{1}3,540	....	....	^{2}6,400 ^{4}13,200	....	....	....	1,000	....	....
	Total	**35,500**	**2,000**	**....**	**....**	**3,540**	**....**	**....**	**19,600**	**....**	**....**	**....**	**1,000**	**....**	**....**
JAPAN	Asia Oil CL–Sakaide, Kagawa	133,000	39,400	....	^{1}15,300	^{3}9,000	....	^{1}25,200 ^{2}15,500	^{1}12,600 ^{4}50,400	....	....	....	....	^{5}32.0	....
	Yokohama, Kanagawa	....	....	....	....	^{2}12,600	....	^{1}28,800	^{1}12,600 ^{4}26,500	....	....	....	....	^{5}49.0	....
	Cosmo Oil CL–Chiba	209,000	57,000	....	^{1}23,400	^{2}22,500	....	^{1}54,000 ^{2}31,500	^{1}33,300 ^{2}7,200 ^{4}51,300	....	....	....	....	^{1}21.0 ^{2}62.0	....
	Matsuyama	....	....	....	....	^{2}4,500	....	....	^{2}7,200 ^{3}9,900	....	^{1}1,800	....	....	....	....
	Sakai	104,500	32,300	....	^{1}17,550	^{2}6,300	....	^{2}18,000	^{1}7,650 ^{4}20,700	....	....	....	....	^{5}10.6	....
	Yokkaichi City	166,250	70,300	....	^{1}22,500	^{2}3,600 ^{4}9,900	....	^{2}31,500	^{1}16,200 ^{4}58,500 ^{6}5,850	....	....	5,850	6,210	^{5}12.0	....
	Fuji Oil CL–Sodegaura	153,700	79,600	^{6}19,000	^{1}12,500	^{2}13,600	....	^{2}52,400	^{1}27,000 ^{4}41,600 ^{7}6,800	....	....	....	....	^{2}27.9	....
	General Sekiyu Seisei KK–Sakai	140,400	63,000	....	^{1}32,500	^{2}26,100	....	^{3}27,900	^{2}36,000 ^{4}54,300	....	^{1}17,200	....	....	^{2}21.4	....
	Idemitsu Kosan CL–Chita, Aichi	123,500	....	....	^{1}27,000	^{4}16,200	....	^{1}49,500	^{1}23,400 ^{4}36,000	^{1}3,700	....	....	....	^{2}63.8 ^{4}13.2	....
	Himeji, Hyogo	104,500	....	....	....	^{2}12,600	....	^{1}36,000	^{1}22,500 ^{4}27,000	....	....	....	....	^{2}33.6	....
	Ichihara, Chiba	199,500	57,000	....	^{1}37,800	^{2}6,840	^{3}9,450	^{1}36,000 ^{3}35,100 ^{5}5,400	^{1}38,700 ^{4}47,700	....	....	5,170	7,900	^{2}64.9 ^{5}3.5	....
	Tokuyama, Yamaguchi	95,000	47,500	....	^{1}20,700	....	....	^{3}40,500	^{1}13,500 ^{4}31,500	....	....	....	1,530	^{2}18.0	....
	Tomakomai, Hokkaido	85,500	19,000	....	....	^{2}16,200	^{1}13,500	....	^{1}24,300 ^{4}22,860	....	....	....	....	^{4}2.4	....
	Kainan Petroleum Refining CL–Kainan	77,600	37,500	....	....	....	....	....	^{4}20,000 ^{6}9,000	....	....	11,600	17,500	^{2}4.0	....
	Kashima Oil CL–Kashima, Ibaragi	150,000	67,000	....	^{1}17,500	^{4}12,500	....	^{1}20,000 ^{2}25,000	^{1}14,500 ^{4}35,000	....	....	....	....	^{1}22.5	....

WORLDWIDE REFINING

		Charge capacity, b/cd							Production capacity, b/cd					
Company and refinery location	Crude	Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
Koa Oil CL–Marifu	110,000	49,000	^{5}22,800	^{1}16,000	^{2}9,700	....	^{2}10,000	^{1}11,000 ^{4}29,000	....	....	....	1,700	^{2}6.6	500
Osaka	80,000	55,000	....	^{1}18,000	^{2}9,000	....	^{2}15,000	^{1}11,000 ^{4}14,000	....	....	....	....	....	....
Kyokuto Petroleum Ltd.–Chiba	120,000	55,000	....	....	^{2}14,500	^{1}28,000	....	^{1}16,000 ^{4}20,000	....	....	....	....	^{2}20.0	....
Kyushu Oil CL–Oita	130,000	66,000	....	^{1}16,500	^{2}8,000	....	^{2}33,000 ^{4}27,000	^{1}9,000	....	....	....	....	^{5}14.9	....
Mitsubishi Oil CL–Kawasaki	55,000	5,800	....	....	^{2}8,500	....	^{4}29,500	^{1}18,500	....	....	....	1,100	....	....
Mizushima	220,000	67,000	....	^{1}34,000	^{2}15,000 ^{4}15,200	....	^{1}45,000 ^{2}30,000 ^{3}30,000 ^{4}31,500	^{1}43,200 ^{3}14,000 ^{6}4,100	*880	^{1}11,700	2,800	6,400	^{2}60.0	....
Nansei Sekiyu KK–Nishihara, Okinawa	45,000	....	....	....	^{1}5,400	....	....	^{2}21,100 ^{4}13,500	....	....	....	....	....	....
Nichimo Sekiyu Seisei KK–Kawasaki	76,000	....	....	....	^{1}7,600	....	....	^{2}7,200 ^{4}22,800	....	....	....	....	....	....
Nihonkai Oil CL–Toyama	50,000	....	....	....	4,000	....	....	5,000	....	....	....	....	....	....
Nippon Mining CL–Chita	85,000	46,000	....	^{1}13,000	^{2}22,000	....	^{2}37,000	^{2}43,000 ^{4}46,000	....	^{1}4,600 ^{2}2,000 ^{3}1,300	....	....	^{1}25.0	....
Funakawa	6,000	2,740	....	....	....	....	....	....	....	....	1,070	....	....	....
Mizushima	190,200	101,000	....	^{1}38,000	^{6}20,000	....	^{1}31,000 ^{2}60,000	^{2}28,300 ^{4}49,100 ^{6}6,000	....	....	4,900	....	^{1}29.0 ^{2}30.0	....
Nippon Oil CL–Niigata	26,000	2,000	....	....	^{2}3,500	....	....	^{5}21,300	....	....	....	425	....	....
Nippon Petroleum Refining CL–Muroran	150,000	50,000	....	^{1}19,000	^{2}19,000	....	^{1}25.000 ^{2}40,000	^{2}32,000 ^{5}48,000	....	....	....	4,160	^{5}62.0	....
Nakagusuku, Okinawa	....	....	....	....	^{2}2,000	....	....	^{1}2,000	....	....	....	....	....	....
Negishi	305,000	110,000	^{3}20,000	^{1}39,000	^{2}44,000	....	^{2}81,000	^{2}53,000 ^{5}69,000 ^{7}3,000	....	....	4,310	6,660	^{5}22.0	....
Yokohama	....	18,500	....	....	^{2}1,300	....	....	^{1}3,300 ^{5}7,300	....	....	2,380	2,500	....	....
Okinawa Sekiyu Seisei–Yonashiro, Okinawa	57,000	....	....	....	....	....	^{1}34,200 ^{2}13,500	^{4}18,000	....	....	....	....	^{2}42.7	....
Seibu Oil CL–Yamaguchi	137,700	42,200	....	^{1}18,100	^{2}12,900	....	^{1}40,100 ^{2}24,900	^{2}48,300 ^{4}24,500	....	....	....	....	^{1}42 4	....
Showa Shell Sekiyu KK–Kawasaki	136,800	27,500	....	....	^{2}19,100	....	^{2}7,600 ^{5}14,200	^{2}30,300 ^{4}18,700	....	^{6}5,500	....	....	....	....
Niigata	27,500	....	....	....	^{2}4,300	....	....	^{2}11,600 ^{4}2.000	....	....	....	....	....	....
Showa Yokkaichi Sekiyu CL–Yokkaichi	215,700	106,500	....	^{1}22,600	^{2}38,100	....	^{2}37,000 ^{5}35,600	^{2}61,400 ^{4}39.200	....	^{1}7,600 ^{6}5,000	5,500	6,300	^{1}28.3	....
Taiyo Oil CL–Ehime	65,000	4,000	....	....	^{2}6,000	....	....	^{1}8,200 ^{4}12,000	....	....	....	....	....	....
Toa Nenryo Kogyo–Kawasaki	190,000	116,900	....	^{1}68,400	^{2}15,200	....	^{3}74,000	^{2}32,300 ^{4}31,400 ^{5}11,400	*4,700	....	....	....	^{2}39.0	....
Wakayama	162,500	74,200	....	^{1}27,800	^{2}34,200	....	^{2}23,800	^{2}33,700 ^{4}39,000 ^{5}20,900	^{1}1,400	....	6,100	....	^{1}16.0	....
Toa Oil CL–Kawasaki	65,000	53,000	^{6}21,000	....	^{2}11,000	....	....	^{2}17,000 ^{3}3,500 ^{4}22,000 ^{5}46,000	....	....	....	....	^{1}34.7	150

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd				Hydrogen, MMcfd	Coke, tons/day
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt		
	Toho Oil CL–Owase	40,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Tohoku Oil CL–Sendai	79,000	54,000	....	....	[2]12,000	....	[3]31,000	[1]12,000 [4]18,000	....	....	....	2,600	....	....
	Total	**4,566,850**	**1,675,940**	**82,800**	**557,150**	**533,940**	**50,950**	**1,393,200**	**2,083,680**	**10,680**	**56,700**	**49,680**	**64,985**	**934.4**	**650**
JORDAN	Jordan Petroleum Refinery–Zerka	100,000	16,900	...	[1]4,410	[2]8,640	[1]4,230	....	[1]11,860 [4]2,000	....	....	....	....	[2]7.9	....
	Total	**100,000**	**16,900**	....	**4,410**	**8,640**	**4,230**	....	**13,860**	....	....	....	....	**7.9**	....
KENYA	Kenya Petroleum Refineries Ltd.–Mombasa	90,000	1,700	....	....	[1]3,800 [2]5,200	....	....	[4]33,000	....	....	....	900	....	....
	Total	**90,000**	**1,700**	....	....	**9,000**	....	....	**33,000**	....	....	....	**900**	....	....
KOREA, N.	Government-owned, Unggi	**42,000**													
KOREA, S.	Honam Oil Refinery CL–Yosu	355,000	....	[3]30,000	....	[2]15,300	....	....	[2]22,500	....	....	....	3,600	....	....
	Kukdong Oil CL–Busan[1]	10,000	7,000	....	....	....	....	....	[2]2,000 [6]1,200	....	....	2,000	4,000	[2]0.4	....
	Kyung In Energy CL–Inchon	60,000	....	....	....	[2]3,600	....	....	[1]3,600 [4]4,000	....	....	....	....	....	....
	Ssangyong Oil Refining CL–Onsan[2]	90,000	22,000	....	....	[1]4,000	[3]7,000	[4]21,000	[1]4,000 [2]1,100 [3]2,400	....	....	4,200	5,000	[2]14.0	....
	Yukong Ltd.–Ulsan	305,000	4,400	....	....	[2]17,650 [6]18,900	....	....	[1]38,900 [4]10,500 [7]2,600	....	[1]11,930 [2]4,900 [3]800	....	2,600	....	....
	Total	**620,000**	**33,400**	**30,000**	....	**59,450**	**7,000**	**21,000**	**92,800**	....	**17,630**	**6,200**	**15,200**	**14.4**	....
	Solvent extraction: [1]2,100 b/d. [2]8,000 b/d.														
KUWAIT	Getty Oil Co. (subsidiary of Texaco Inc.)–Mina Al-Zour	70,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Kuwait National Petroleum Co.–Mina Abdulla	75,000	....	....	....	....	....	[1]35,000	....	....	....	....	....	[1]30.0	....
	Mina Al-Ahmadi	288,000	77,000	....	[1]30,000	[2]36,000	[1]38,000	[1]131,800 [4]55,500 [4]15,800	[1]36,000	....	....	....	....	[1]168.0 [5]69.4	....
	Shuaiba	195,000	140,000	....	....	[2]15,000	[1]67,000 [2]54,000	[4]70,000 [5]30,000	....	....	....	....	....	[1]220.0	....
	Total	**628,000**	**217,000**	....	**30,000**	**51,000**	**159,000**	**338,100**	**36,000**	....	....	....	....	**507.4**	....
LEBANON	Tripoli Oil Installations–Tripoli	20,000	12,730	....	[1]7,250	[2]4,392	....	[2]7,392	....	....	....	....	409	....	....
	Mediterranean Refining Co.–Sidon	17,000	....	....	....	[1]3,100	....	....	[1]3,100	....	....	....	....	....	....
	Total	**37,000**	**12,730**	....	**7,250**	**7,492**	....	**7,392**	**3,100**	....	....	....	**409**	....	....
LIBERIA	Liberia Petroleum Refining–Monrovia	15,000	1,000	....	....	[1]2,000	....	....	[1]2,300 [4]1,000	....	....	....	200	....	....
	Total	**15,000**	**1,000**	....	....	**2,000**	....	....	**3,300**	....	....	....	**200**	....	....

WORLDWIDE REFINING	Company and refinery location		Charge capacity, b/cd							Production capacity, b/cd					
		Crude	Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. °Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
LIBYA	Azzawiya Oil Refining Co.–Azzawiya	120,000	3,432	....	....	^{2}12,982	....	....	16,908 ^{5}18,718	....	....	....	1,716	....	....
	Ras Lanuf Oil & Gas Processing Co.–Ras Lanuf	201,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Sirte Oil Co.–Brega	8,400	....	....	....	^{1}1,600	....	....	^{2}1,600	....	....	....	....	....	....
	Total	**329,400**	**3,432**	....	....	**14,582**	....	....	**37,226**	....	....	....	**1,716**	....	....
MADAGASCAR	Solima–Managareza, Tamatave	**16,350**	**1,200**	**^{3}7,000**	....	**^{1}2,600**	....	**^{2}3,600**	**^{1}5,500**	....	....	....	....	....	....
MALAYSIA	Esso Malaysia Berhad–Port Dickson	47,300	4,750	....	....	^{2}7,410	....	....	^{1}14,250 ^{4}13,600		....	....	....	....	....
	Petronas Penapisan Sdn. Berhad–Kerteh, Kemaman, Terengganu	30,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Sarawak Shell Berhad–Luton	45,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Shell Refining Co. Berhad–Port Dickson	90,000	2,400	....	....	^{1}4,000 ^{1}10,000	....	....	^{2}28,000 ^{5}5,000	....	....	1,700	....	....	....
	Total	**212,300**	**7,150**	....	....	**21,410**	....	....	**60,850**	....	....	**1,700**	....	....	....
MARTINIQUE	Ste. Anonyme de la Raffinerie des Antilles–Fort-de-France	12,800	....	....	....	^{2}7,410	....	....	^{1}4,850 ^{4}3,500	....	....	....	....	....	....
	Total	**12,800**	....	....	....	**7,410**	....	....	**8,350**	....	....	....	....	....	....
MEXICO	Petroleos Mexicanos–Azcapotzalco	110,000	48,000	^{3}20,000	^{1}24,000	....	....	....	....	^{2}1,200 °430	....	....	....	....	....
	Cadereyta	235,000	137,000	....	^{1}40,000	^{2}20,000	....	^{4}50,000	^{1}36,000	....	....	....	....	....	....
	Ciudad Madero[1]	195,000	81,500	^{3}8,000 ^{4}9,000	^{1}43,000	^{2}15,000	....	^{4}37,000	^{1}15,000	^{2}1,200 °430	....	....	....	^{1}10.0	260
	Minatitlan	200,000	83,000	....	^{1}24,000 ^{2}16,000	^{2}48,000	....	^{4}37,000	^{1}52,000	°600	^{1}6,820 ^{2}1,400 ^{3}2,374	500	....	....	....
	Poza Rica	50,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Reynosa	9,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Salamanca	235,000	101,200	^{3}4,000	^{1}40,000	^{2}24,800	^{2}18,000	^{2}26,000	^{1}33,000 ^{6}10,000	....	....	15,000	....	^{1}60.0	....
	Salina Cruz	165,000	75,000	....	^{1}40,000	^{6}20,000	....	^{4}50,000	^{1}25,000	....	....	....	....	....	....
	Tula, Hidalgo	155,000	75,000	^{3}41,000	^{2}40,000	^{2}30,000	....	^{4}50,000	^{1}36,000	....	....	....	....	....	....
	Total	**1,354,000**	**600,700**	**82,000**	**267,000**	**157,800**	**18,000**	**250,000**	**207,000**	**3,860**	**10,594**	**15,500**	....	**70.0**	**260**
MOROCCO	Samir–Mohammedia	129,000	20,000	....	....	^{2}24,000	....	....	^{1}24,000 ^{5}9,700 ^{6}2,100	....	....	2,100	13,700	....	....
	Ste. Cherifienne des Petroles–Sidi Kacem	25,600	7,400	....	^{2}5,600	^{1}2,800	....	....	^{1}2,800	....	....	....	....	....	....
	Total	**154,600**	**27,400**	....	**5,600**	**26,800**	....	....	**38,600**	....	....	**2,100**	**13,700**	....	....

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[1] Solvent extraction: ^{1}35,000 b/cd.

			Charge capacity, b/cd							Production capacity, b/cd					
WORLDWIDE REFINING	Company and refinery location	Crude	Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
NETHERLANDS	BP Raffinaderij Nederland NV–Rotterdam	437,000	73,000	^{3}35,000	^{1}47,500	^{2}27,000	....	^{4}33,200	^{2}148,000	^{2}4,700	....	....	....	....	....
	Esso Nederland BV–Rotterdam	155,000	66,500	^{6}28,700	....	^{4}25,200	....	....	^{1}25,200 ^{2}9,900 ^{4}61,200 ^{5}13,500	....	....	....	....	^{1}21.0	....
	Kuwait Petroleum Europoort BV–Rotterdam	75,500	32,870	^{2}9,460 ^{3}6,400	....	^{2}8,200	....	....	^{1}12,120 ^{4}28,400 ^{6}5,780	....	....	4,600	8,500	....	....
	Shell Nederland Raffinaderij BV–Pernis	348,000	148,000	^{3}45,000	^{1}78,000	^{2}17,000 ^{6}35,000	....	^{2}77,000	^{2}138,000 ^{3}8,000 ^{6}300	^{2}6,800	....	7,100	5,500	....	....
	Smid & Hollander Raffinaderij BV–Amsterdam	8,500	8,000	....	....	....	....	....	....	....	....	....	6,500	....	....
	Texaco Petroleum Mij. (Nederland) BV–Pernis	207,000	28,000	^{3}27,000	....	^{2}29,000	....	^{4}38,000	^{1}29,000	....	....	....	....	....	....
	Total Raffinaderij Nederland NV–Vlissingen	150,000	45,000	....	....	^{2}16,000	^{1}30,000	....	^{1}18,000 ^{5}25,000	....	....	....	....	^{1}65.0	....
	Total	**1,381,000**	**401,370**	**151,560**	**125,500**	**157,400**	**30,000**	**148,200**	**522,400**	**11,500**	....	**11,700**	**20,500**	**86.0**	....
NETHERLANDS ANTILLES	Refineria Isla Curazao SA–Emmastad	320,000	158,000	^{2}67,000	^{1}42,000	^{2}15,000	....	....	^{2}60,000 ^{4}34,000 ^{5}25,000 ^{6}2,500	^{2}5,000 *600	....	8,000	8,000	....	....
	Total	**320,000**	**158,000**	**67,000**	**42,000**	**15,000**	....	....	**121,500**	**5,600**	....	**8,000**	**8,000**	....	....
NEW ZEALAND	New Zealand Refining–Whangarei	81,700	38,700	....	....	^{2}21,700	^{1}20,100	^{2}6,000	^{1}32,100 ^{4}10,100	....	....	....	2,100	^{1}45.0	....
	Total	**81,700**	**38,700**	....	....	**21,700**	**20,100**	**6,000**	**42,200**	....	....	....	**2,100**	**45.0**	....
NICARAGUA	Esso Standard Oil SA Ltd.–Managua	14,500	2,000	....	....	^{1}2,800	....	....	^{2}4,800 ^{7}5,200	....	....	....	800	....	....
	Total	**14,500**	**2,000**	....	....	**2,800**	....	....	**10,000**	....	....	....	**800**	....	....
NIGERIA	Nigerian Petroleum Refining CL–Kaduna[1]	110,000	38,200	....	^{1}21,000	^{1}17,000	....	....	^{1}24,000 ^{4}17,500 ^{7}49,580	....	....	4,309	....	....	....
	Port Harcourt, Alesa Eleme	60,000	....	....	....	^{1}6,000	....	....	....	....	....	....	....	....	....
	Warri	100,000	32,000	....	^{1}26,000	^{2}16,700	....	....	^{1}16,700 ^{5}8,600	....	....	....	....	....	....
	Total	**270,000**	**70,200**	....	**47,000**	**39,700**	....	....	**116,380**	....	....	**4,309**	....	....	....

Solvent extraction: ^{1}9,492 b/cd.

			Charge capacity, b/cd							Production capacity, b/cd					
WORLDWIDE REFINING	Company and refinery location	Crude	Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
NORWAY	Esso Norge AS–Slagen-Valloy	90,000	3,000	[2]12,500 [3]28,000	....	[2]9,150	....	[5]7,500	[1]17,500	....	....	....	2,000	....	....
	Norske Shell AS–Sola	80,000	....	[2]26,000	....	[2]10,000	....	[1]16,000 [4]9,000	....	....	....	....	....	....	....
	Rafinor AS-Mongstad	90,000	....	[5]20,000	....	[2]10,000	....	....	[2]10,000 [5]16,000	....	[6]3,000	....	....	....	480
	Total	**240,000**	**3,000**	**86,500**	....	**29,150**	....	**32,500**	**43,500**	....	**3,000**	....	**2,000**	....	**480**
OMAN	Oman Refinery Co.–Mina Al Fahal	**76,932**	....	....	....	**[2]15,388**	....	....	**[1]19,506**	....	....	....	....	....	....
PAKISTAN	Attock Refinery Ltd.–Rawalpindi	36,000	1,000	....	....	....	....	....	....	....	....	115	100	....	....
	National Refinery Ltd.– Korangi, Karachi	47,750	13,200	....	....	[2]2,750	....	....	[1]2,800 [4]4,000	....	[1]1,250	3,700	3,950	[1]0.1	....
	Pakistan Refinery Ltd.–Karachi	46,300	....	....	....	[1]2,700	....	....	[7]18,000	....	....	....	....	....	....
	Total	**130,050**	**14,200**	....	....	**5,450**	....	....	**24,800**	....	**1,250**	**3,815**	**4,050**	**0.1**	....
PANAMA	Refineria Panama SA–Las Minas	100,000	14,000	....	....	[2]7,500	....	....	[1]10,000 [4]20,000	....	....	....	5,000	....	....
	Total	**100,000**	**14,000**	....	....	**7,500**	....	....	**30,000**	....	....	....	**5,000**	....	....
PARAGUAY	Petroleos Paraguayos–Villa Elisa	**7,500**	....	....	....	....	....	....	....	....	....	....	....	....	....
PERU	Petróleos del Peru:														
	Conchan	5,670	3,915	....	....	....	....	....	....	....	....	....	....	....	....
	Iquitos, Loreto	9,450	....	....	....	....	....	....	....	....	....	....	....	....	....
	La Pampilla, Lima	99,750	11,400	....	[1]6,365	[1]1,680	....	....	....	....	....	....	....	....	....
	Marsella, Loreto	1,953	....	....	....	....	....	....	....	....	....	....	....	....	....
	Pucallpa	2,565	....	....	....	....	....	....	....	....	....	....	....	....	....
	Talara	62,630	21,600	....	[1]14,940	....	....	....	....	....	....	1,080	....	....	....
	Total	**182,018**	**36,915**	....	**21,305**	**1,680**	....	....	....	....	....	**1,080**	....	....	....
PHILIPPINES	Caltex (Philippines) Inc.–Batangas	63,000	18,100	....	[1]8,100	[2]8,100	....	....	[1-2]10,800 [4]14,400	....	....	....	....	....	....
	Petron Corp.–Limay, Bataan	155,000	20,000	....	[2]15,000	[1]23,800	....	[2]18,000	[2]52,000	*4,400	....	....	5,000	....	....
	Philippine Petroleum Corp.–Pililla	....	20,500	....	....	....	....	....	....	....	....	3,400	....	....	....
	Pilipinas Shell Petroleum–Tabangao	68,000	....	....	....	[1]8,300	....	[2]5,500	[2-4]15,500	....	....	....	....	....	....
	Total	**286,000**	**58,600**	....	**23,100**	**40,200**	....	**23,500**	**92,700**	**4,400**	....	**3,400**	**5,000**	....	....
POLAND	Government-owned refineries at Czechowice, Gdansk, Glinik Mariampolski, Jasto, Jealicze, Kralaty, L. Warynski, Plock, Trzebinia. Of these, Plock is by far the largest, accounting for roughly 80% of Polish refinery production. Its crude capacity is nearly 300,000 b/d.														
	Total	**385,000**													
PORTUGAL	Petrogal–Lisbon	....	18,900	....	[2]10,100	....	....	[1]3,400	....	....	....	....	700	....	....
	Leça da Palmeira, Porto	88,300	11,000	....	....	[5]10,500	....	....	[1]12,200 [4]7,300	....	....	3,400	1,700	....	....
	Sines	206,000	23,300	....	....	[6]24,900	[1]9,400	[2]13,800 [4]28,800	[1]24,900	....	....	....	2,200	....	....
	Total	**294,300**	**53,200**	....	**10,100**	**35,400**	**9,400**	**46,000**	**44,400**	....	....	**3,400**	**4,600**	....	....

			Charge capacity, b/cd							Production capacity, b/cd					
WORLDWIDE REFINING	Company and refinery location	Crude	Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/ Isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
PUERTO RICO	Bayamón Refinery–Bayamón	38,000	19,300	....	[1]12,000	[2]5,800	....	....	[2]5,900 [4]9,800	*1,000	....	....	900	....	....
	Yabucoa Sun Oil Co.–Yabucoa[1]	85,000	40,000	....	....	....	[3]15,000	[4]10,000	....	....	....	6,800	....	[2]17.0	....
	Total	**123,000**	**59,300**	**....**	**12,000**	**5,800**	**15,000**	**10,000**	**15,700**	**1,000**	**....**	**6,800**	**900**	**17.0**	**....**
	Solvent extraction: [1]7,000.														
QATAR	National Oil Distribution Co.–Umm Said	62,000	....	....	....	[2]2,200 [6]9,630	....	....	[2]17,240 [4]10,500 [5]11,900	....	....	....	....	....	....
	Total	**62,000**	**....**	**....**	**....**	**12,030**	**....**	**....**	**39,640**	**....**	**....**	**....**	**....**	**....**	**....**
ROMANIA	Government-owned refineries at Bacau, Borzesti, Brazi, Brazov, Cimpina, Darmanesti, G. Gheorghiu Dej, Navodari, Onesti, Pitesti, Ploesti, Sulpacu, and Telaejen.														
	Total	**617,000**													
SAUDI ARABIA	Arabian American Oil Co.–Ras Tanura	450,000	30,000	....	....	[4]60,000	....	....	[1]60,000	....	....	....	12,500	....	....
	Arabian Oil CL–Ras Al Khafji	30,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Jeddah Oil Refinery–Jeddah	91,000	15,000	....	[1]10,000	[2]2,900	....	....	....	....	....	....	2,500	....	....
	Petromin-Mobil–Yanbu	250,000	106,000	....	[1]66,000	[6]32,000	....	....	[1]32,000 [4]40,000	[2]12,500	....	....	10,000	....	....
	Petromin-Shell–Al-Jubail[1]	250,000	68,000	[2]27,000	....	[6]15,000	[1]34,000	[2]39,000	[1]15,000 [2]26,000 [4]47,000	....	[1]7,000 [2]4,400	....	....	[1]90.0	....
	Riyadh Oil Refinery–Riyadh[2]	134,000	52,655	....	....	[2]28,600 [5]5,400	[2]31,100	....	[2]30,900 [4]12,900	....	8,000	....	5,500	117.0	....
	Yanbu Domestic Refinery–Yanbu	170,000	....	....	....	[2]35,000	....	....	[1]35,000 [4]15,200	....	....	....	....	....	....
	Total	**1,375,000**	**271,655**	**27,000**	**76,000**	**178,900**	**65,100**	**39,000**	**314,000**	**12,500**	**19,400**	**....**	**30,500**	**207.0**	**....**
	Solvent extraction: [1]12,500 b/cd. [2]8,800 b/cd.														
SENEGAL	**Ste. Africaine de Raffinage–M'Bao (Dakar)**	**29,800**	**18,800**	**....**	**....**	**[4]2,870**	**....**	**....**	**[1]2,870**	**....**	**....**	**....**	**....**	**....**	**....**
SIERRA LEONE	**Sierra Leone Petroleum Refining Co.–Freetown**	**10,000**	**....**	**....**	**....**	**....**	**....**	**....**	**....**	**....**	**....**	**....**	**....**	**....**	**....**
SINGAPORE	BP Refinery Singapore PL Pasir Panjang	28,000	....	....	....	....	....	....	....	....	....	....	....	....	....
	Esso Singapore PL–Pulau Ayer Chawan	176,000	41,800	....	....	[2]8,600	....	....	[2]19,000 [4]48,400	....	....	7,000	3,400	....	....
	Mobil Oil Singapore PL–Jurong	193,000	70,000	[3]45,000	....	[2]14,000	....	[4]5,700	[1]22,000 [5]28,000	....	....	....	....	....	....
	Shell Eastern Petroleum Ltd.–Pulau Bukom	300,000	85,600	[2]64,700	....	[2-4]20,700	[1]21,600	[1]44,600	[2-4]107,000	....	....	5,800	4,300	[1]40.1	....

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd					
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
	Singapore Refinery CPL†–Pulau Merlimau	161,000	58,700	[3]28,000	....	[4]11,000	[1]9,500 [4]17,000	[4]36,000	[1]11,000	....	....	....	4,300	[2]18.0 [4]14.0 [5]7.0	....
	Total	**858,000**	**256,100**	**137,700**	....	**54,300**	**48,100**	**86,300**	**235,400**	....	....	**12,800**	**12,000**	**79.1**	....
	†Singapore Petroleum CPL shares percentages of refinery capacities.														
SOMALIA	Iraqsoma Ref. Co.–Mogadishu	**10,000**	....	....	....	....	....	....	....	....	....	....	....	....	....
SOUTH AFRICA	Caltex Oil SA PL–Cape Town	90,000	44,000	[3]9,500	[1]25,000	[2]10,500	....	[4]22,300	[1]14,250	....	....	....	1,140	....	....
	Mobil Oil Refining Co.–Southern Africa PL–Durban	65,000	32,000	[3]11,000	[1]15,000	[2]15,000	....	....	[1]21,000 [5]26,000	[2]2,200	[4-6]6,000	....	4,000	....	....
	†Durban	....	....	....	....	....	....	....	....	....	....	3,000	....	....	....
	National Petroleum Refiners of South Africa PL–Sasolburg OFS	78,500	28,000	....	[1]17,400	[2]11,300	[1]8,600 [2]9,400	....	[1]11,300 [4]10,600	[2]4,800	[4]3,400	....	1,000	[1]25.0 [5]9.0	....
	Shell and BP South Africa Petroleum Refineries PL–Durban	200,000	....	[3]43,000	[1]27,000	[2]26,000	....	[4]55,000	[4]57,000	....	....	....	....	....	....
	Total	**433,500**	**104,000**	**63,500**	**84,400**	**62,800**	**18,000**	**77,300**	**142,150**	**7,000**	**9,400**	**3,000**	**6,140**	**34.0**	....
	†South African Oil Refinery PL is owner; Mobil is operator.														
SPAIN	Asfaltos Españoles SA–Tarragona	21,000	16,800	....	....	....	....	....	....	....	....	....	15,000	....	....
	Cia. Española de Petróles–San Roque (Cádiz)	160,000	40,000	[3]35,000	[1]36,000	[2]35,000	....	....	[4]30,000	....	[1]12,500 [2]1,800	....	....	....	....
	Tenerife	130,000	....	[3]35,000	....	[2]15,000	....	....	[3]28.000	....	....	900	15,000	....	....
	Petróleos del Mediterraneo–Castellón de la Plana	112,000	24,000	....	[1]14,000	[2]14,000	....	[2]11,000 [4]25,000	[2]25,000	....	....	....	1,650	....	....
	Petronor SA–Somorrostro, Vizcaya	240,000	95,000	[3]45,000	[1]45,000	[2]33,500	....	[3]35,000	[2]48,600 [4]40,700	....	....	....	10,000	[2]12.0	....
	Repsol Petroleo SA–Cartagena, Murcia	112,000	18,000	....	....	[2]25,000	....	[4]30,000	[2]29,000	....	....	3,500	3,500	....	....
	La Coruña	135,000	29,000	[2]10,500 [5]13,500	[1]25,000	[2]18,500	....	[4]17,000	[1]18,500	....	....	....	....	[1]3.4	540
	Puertollano, Ciudad Real	135,000	64,000	....	[1]23,500	[2]18,000	....	[2]9,500 [4]21,000	[2]18,000 [3]2,400 [6]1,900	....	[2]1,700	3,000	3,500	[2]6.2	....
	Tarragona	180,000	63,000	[3]30,000	....	[2]16,000	[1]15,000	[3]22,000 [4]20,000	[2]16,000	....	....	....	....	[1]10.0	....
	Unión Explosivos Rio Tinto SA–La Rábida, Huelva	80,000	25,000	[3]9,000	....	[2]14,100	....	....	[1]14,100 [4]8,000 [6]2,800	....	[1]2,420 [2]3,500 [3]1,800	1,900	6,900	[1]25.0 [5]6.0	....
	Total	**1,305,000**	**374,800**	**178,000**	**143,500**	**189,100**	**15,000**	**190,500**	**283,000**	....	**23,720**	**9,300**	**55,550**	**62.6**	**540**
SRI LANKA	Ceylon Petroleum Corp.–Sapugaskanda	50,000	2,400	[3]12,500	....	[2]3,750	....	[2]2,100	[1]8,000 [4]7,300	....	....	....	1,000	....	....
	Total	**50,000**	**2,400**	**12,500**	....	**3,750**	....	**2,100**	**15,300**	....	....	....	**1,000**	....	....

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd					
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
SUDAN	Port Sudan Refinery Ltd.–Port Sudan	**21,440**	....	....	....	**[1]1,700**	....	....	**[4]7,400**	....	....	....	....	....	....
SWEDEN	AB Nynas Petroleum–Gothenburg	12,500	9,000	....	....	....	....	....	....	....	....	....	8,500	....	....
	Nynäshamn	28,000	31,000	....	....	....	....	....	[6]2,500	....	....	2,500	20,000	[2]1.9	....
	BP Raffinaderi–Gothenburg	106,000	....	....	....	[2]20,500	....	....	[4]45,000	....	....	....	....	....	....
	Shell Raffinaderi BV–Gothenburg.....	80,000	17,000	[2]27,000	....	[2]16,000	....	[2]16,000	[2]22,000 [4]5,000	....	[6]4,000	....	....	....	....
	Skandinaviska Raffinaderi AB– Brofjorden-Lysekil	210,000	68,000	[3]41,000	[1]27,000	[4]36,200	....	[3]46,000 [4]30,000	[1]45,000	*3,300	....	....	....	....	....
	Total	**436,500**	**125,000**	**68,000**	**27,000**	**72,700**	**....**	**92,000**	**119,500**	**3,300**	**4,000**	**2,500**	**28,500**	**1.9**	**....**
SWITZERLAND	Raffinerie de Cressier SA–Cressier ...	60,000	24,000	[2]11,000 [3]9,000	....	[2]16,000	....	[2]8,000	[1]27,000 [4]5,500	....	[6]3,600	....	5,200	....	....
	Raffinerie du Sud-Ouest SA– Collombey	72,000	....	....	....	[2]10,000	....	....	[1]16,700	....	....	....	....	....	....
	Total	**132,000**	**24,000**	**20,000**	**....**	**26,000**	**....**	**8,000**	**49,200**	**....**	**3,600**	**....**	**5,200**	**....**	**....**
SYRIA	Banias Refining Co.–Banias	126,350	54,101	[3]24,099	....	[3]16,728	....	....	[1]16,769 [4]6,828 [6]14,266	....	....	....	4,016	....	....
	Homs Refinery Co.–Homs	102,440	6,510	[5]17,100	....	[3]2,620	....	[4]26,040	....	....	....	....	4,020	9.5	685
	Total	**228,790**	**60,611**	**41,199**	**....**	**19,340**	**....**	**26,040**	**37,863**	**....**	**....**	**....**	**8,036**	**9.5**	**685**
TANZANIA	Tanzanian & Italian Petroleum Refining CL–Kigamboni, Dar es Salaam	**13,500**	**....**	**....**	**....**	**[2]3,000**	**....**	**....**	**[4]5,000**	**....**	**....**	**....**	**....**	**....**	**....**
THAILAND	Esso Standard Thailand Ltd.–Sriracha	63,000	6,200	....	....	[2]6,700	....	....	[2]16,200 [4]10,000 11,400	....	....	....	2,500	....	....
	Petroleum Authority of Thailand– Bangchak, Bangkok	65,000	....	....	....	[2]10,500	....	....	[1]5,500 [2]6,500 [7]18,000	....	....	....	....	[1]4.7	....
	Thai Oil CL–Sriracha	63,860	18,750	[3]9,600	[1]9,250	[1]2,800 [2]5,300	....	....	[2]32,000 [5]10,000	....	....	....	1,100	....	....
	Total	**191,860**	**24,950**	**9,600**	**9,250**	**25,300**	**....**	**....**	**109,600**	**....**	**....**	**....**	**3,600**	**4.7**	**....**
TOGO	Ste. Togolaise des Hydrocarbures– Lome	**20,000**	**....**	**....**	**....**	**[4]4,400**	**....**	**....**	**[1]7,600**	**....**	**....**	**....**	**....**	**....**	**....**
TRINIDAD	Trinidad and Tobago Oil CL– Pointe-a-Pierre	220,000	166,000	[3]18,000	[1]25,000	[4]25,000	....	[2]100,000	[5]18,000 [6]3,800	[1]2,200 *450	[1]2,800	2,700	....	....	....
	Point Fortin	80,000	5,000	....	....	[3]6,000	....	[5]4,500	[4]20,000	....	....	....	2,000	....	....
	Total	**300,000**	**171,000**	**18,000**	**25,000**	**31,000**	**....**	**104,500**	**41,800**	**2,650**	**2,800**	**2,700**	**2,000**	**....**	**....**
TUNISIA	Ste. Tunisienne Industries des Raffinage–Bizerte	**34,000**	**....**	**....**	**....**	**3,300**	**....**	**....**	**....**	**....**	**....**	**....**	**....**	**....**	**....**

WORLDWIDE REFINING		Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd					
				Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydrocracking	Cat hydrorefining	Cat hydrotreating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
TURKEY		Anadolu Tasfiyehanesi AS–Mersin	90,000	....	....	....	^{2}10,500	....	....	^{1}22,000 ^{4}11,500	....	....	....	....	....	....
		Turkish Petroleum Refineries Corp.:														
		Aliaga-Izmir[1]	204,000	33,000	....	^{1}14,000	^{2}9,800	....	^{2}4,777	^{2}13,649 ^{7}5,460	....	....	3,830	5,441	^{5}0.4	90
		Batman, Siirt	20,000	3,500	^{6}4,500	....	^{1}1,300	....	....	^{2}1,300	....	....	....	3,500	....	18
		Izmit	248,455	88,060	....	^{1}20,100	^{2}23,430	....	....	^{1}26,600 ^{2}6,300 ^{4}45,300	....	....	....	8,800	....	....
		Kirikkale	113,140	30,000	....	....	^{1}20,340	....	....	^{1}20,340 ^{4}17,300 ^{5}15,000		....	....	5,700	....	....
		Total	675,595	154,560	4,500	34,100	65,370	....	4,777	184,749	....	....	3,830	23,441	0.4	108
		Solvent extraction: ^{1}10,273 b/cd (furfural), 6,038 b/cd (propane deasphalting).														
UNITED KINGDOM	England	Conoco Ltd.–South Killingholme	130,000	104,000	^{2}40,000 ^{5}60,000	^{1}38,000	^{2}60,000	....	....	$^{4\text{-}5}$151,000	*3,500	^{1}3,000 ^{6}19,000	....	....	....	2,150
		Esso Petroleum CL–Fawley	300,200	120,840	....	^{1}76,500	^{2}27,900 ^{4}22,500	....	....	$^{1\text{-}2}$73,260 $^{4\text{-}5}$104,130 ^{6}7,200	*12,600	^{6}16,150	7,200	7,650	....	....
		Lindsey Oil Refinery Ltd.– Killingholm, South Humberside	190,000	80,000	^{3}26,000	^{1}40,000	^{2}33,600	....	^{4}40,600	$^{1\text{-}2}$45,400 ^{3}3,600	^{1}4,100 *1,900	....	....	7,100	....	....
		Mobil Oil CL–Coryton, Essex	145,000	86,000	....	^{1}47,000	^{2}27,000	....	....	^{1}35,000 ^{5}33,000	^{2}14,500	^{4}8,500	5,500	1,700	....	....
		Phillips Imperial Petroleum Ltd.– Port Clarence	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
		Philmac Oils Ltd.–Eastham, Cheshire	12,000	10,500	....	....	....	....	....	....	....	....	....	8,000	....	....
		Shell U.K. Ltd.–Shell Haven	92,000	30,000	....	....	^{6}34,000	^{1}21,000	....	^{1}34,000 ^{4}29,000	....	....	....	3,000	....	....
		Stanlow	262,000	90,000	....	^{1}54,000	^{1}29,000 ^{6}27,000	....	^{2}41,000	^{1}56,000 ^{2}14,000	....	^{1}9,000 ^{2}5,000	4,500	8,000	....	....
		Total	1,231,200	521,340	126,000	255,500	251,000	21,000	81,600	585,590	36,600	60,650	17,200	34,450	....	2,150
	Scotland	BP Refinery Grangemouth Ltd.– Grangemouth	178,500	76,000	....	^{1}19,000	^{2}32,000	....	....	^{4}62,500	^{2}3,800	....	....	....	^{1}77.4	....
		William Briggs & Sons Ltd.—Dundee	6,000	5,250	....	....	....	....	....	....	....	....	....	4,000	....	....
		Total	184,500	81,250	....	19,000	32,000	....	....	62,500	3,800	....	....	4,000	77.4	....
	Wales	Amoco UK Ltd.–Milford Haven	102,000	48,500	....	^{1}31,500	^{2}17,500	....	....	^{2}17,500 ^{4}29,000	^{2}3,100 †1,200	....	....	....	....	....
		BP Refinery Llandarcy Ltd.– Llandarcy, Neath	....	27,000	....	....	....	....	....	....	....	....	4,400	....	....	....
		Gulf Oil-GB–Milford Haven	105,000	37,000	....	....	^{2}18,000	....	....	^{2}29,000 ^{3}14,000	....	....	....	....	....	....
		Pembroke Cracking Co. (65% Texaco, 35% Gulf Oil-GB)	....	....	....	^{1}86,000	....	....	....	....	^{2}22,000	^{4}10,000	....	....	^{5}0.8	....
		Texaco Ltd.–Pembroke, Dyfed	160,000	91,000	^{3}26,000	....	^{6}39,000	....	^{4}34,000	^{1}39,000	....	....	....	....	....	....
		Total	387,000	203,500	26,000	117,500	74,500	....	34,000	128,500	26,300	10,000	4,400	....	0.8	....
		Total United Kingdom	1,802,700	806,090	152,000	392,000	367,500	21,000	115,600	776,590	66,700	70,650	21,600	39,450	78.2	2,150

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†Dimersol.

WORLDWIDE REFINING	Company and refinery location	Crude	Charge capacity, b/cd							Production capacity, b/cd					
			Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
URUGUAY	Ancap–La Teja, Montevideo	45,000	12,000	....	^{1}5,000	^{1}3,000	....	....	^{1}3,000 ^{4}5,000	....	....	....	3,000	....	....
	Total	**45,000**	**12,000**	....	**5,000**	**3,000**	....	....	**8,000**	....	....	....	**3,000**	....	....
U.S.S.R.	Government-owned refineries at Achinsk, Angarsk, Baku, Batumi, Chimkent, Drogobych, Fergana, Gorki, Grozny, Guryev, Ishimbai, Khabarovsk, Kherson, Kuibyshev, Lisichansk, Mazheikiai, Moscow, Mozyr, Nadvornaya, Nizhnekamsk, Odessa, Omsk, Orsk, Pavlodar, Perm, Polotsk, Ryazan, Saratov, Syzran, Kirishi, Komsomolsk, Krasnovodsk, Kremenchug, Tuapse, Ufa, Ukhta, Vannovskiy, Volgograd, and Yaroslavl.														
	Total	**12,260,000**													
VENEZUELA	Corpoven–El Palito, Carabobo	105,000	63,200	....	^{1}45,000	^{1}6,000	....	....	....	^{1}20,500	....	....	....	....	....
	El Toreño, Barinas	4,500	....	....	....	....	....	....	....	....	....	....	....	....	....
	Puerto La Cruz, Anzoategui	195,100	....	....	^{1}11,400	....	....	....	....	^{1}2,100	....	....	....	....	....
	San Roque, Anzoategui	5,200	1,700	....	....	....	....	....	....	....	....	....	....	....	....
	Lagoven–Judibana, Falcon	600,000	343,600	^{6}49,700	^{1}76,100	....	....	^{2}162,000 ^{4}65,300	....	^{2}16,000	^{4}8,400	1,890	39,800	^{1}82.9	100
	Maraven–Punta Cardon, Falcon	291,300	152,100	^{3}88,300	^{1}60,600	....	....	^{2}33,700 ^{4}35,100	....	^{1}22,650	^{4}9,900	5,700	....	^{1}26.0	....
	Total	**1,201,100**	**560,600**	**138,000**	**193,100**	**6,000**	....	**296,100**	....	**61,250**	**18,300**	**7,590**	**39,800**	**108.9**	**100**
VIRGIN ISLANDS	Hess Oil Virgin Islands Corp.–St. Croix	545,000	215,000	^{3}80,000	....	^{2}125,000	....	^{2}130,000	^{2}125,000 ^{4}165,000	....	^{1}30,000 ^{5}15,000	....	....	....	....
	Total	**545,000**	**215,000**	**80,000**	....	**125,000**	....	**130,000**	**290,000**	....	**45,000**	....	....	....	....
YEMEN, N.	Yemen Hunt Oil Co.–Marib	**10,000**	....	....	....	**^{1}2,500**	....	....	....	....	....	....	....	....	....
YEMEN, S.	Aden Refinery Co.–Little Aden	**170,000**	**10,000**	....	....	**^{1}12,000**	....	....	....	....	....	....	....	....	....
YUGOSLAVIA	Bosanski Brod^{1}	112,835	44,609	....	....	^{2}7,612 ^{6}13,500	^{3}7,200	....	^{1}20,200 ^{4}13,438	....	....	....	13,310	^{1}14.0	....
	Lendava	18,100	....	....	....	....	....	....	....	....	....	....	....	....	....
	Novi Sad	58,000	30,000	....	....	^{2}8,200	....	^{4}4,600	^{1}10,700 ^{4}4,400 ^{6}4,600	....	....	1,500	4,000	^{1}0.5	....
	Pančevo	108,000	44,850	^{3}21,700	^{1}20,750	^{2}8,800	....	^{4}5,000 ^{5}9,370	^{1}8,800	^{1}3,400	^{1}215	....	6,300	....	....
	Rijeka	160,000	43,000	^{2}8,000	^{1}21,300	^{2}17,500	....	^{4}3,000	^{1}17,500 ^{6}5,000	....	^{1}2,800 ^{2}1,535 ^{6}9,000	2,200	8,000	^{1}0.4	....
	Sisak	150,000	15,700	^{5}5,930	^{1}10,000	^{2}19,000	....	....	^{1}16,900 ^{3}3,640 ^{5}2,700	....	^{1}4,900	....	3,715	....	137
	Zagreb	700	500	....	....	....	....	....	....	....	....	1,200	....	....	....
	Total	**607,635**	**178,759**	**35,630**	**52,050**	**74,612**	**7,200**	**21,970**	**107,878**	**3,400**	**18,450**	**4,900**	**35,325**	**14.9**	**137**

Solvent extraction: ^{1}3,300 b/cd (deasphalting).

WORLDWIDE REFINING	Company and refinery location	Crude	Vacuum distillation	Thermal operations	Catalytic cracking	Cat reforming	Cat hydro-cracking	Cat hydro-refining	Cat hydro-treating	Alky. *Poly.	Aromatics/ isomerization	Lubes	Asphalt	Hydrogen, MMcfd	Coke, tons/ day
ZAIRE	Sozir–Muanda	**17,000**	....	....	....	**^{2}3,000**	....	....	**^{1}5,000**	....	....	....	....	....	....
ZAMBIA	Indeni Petroleum Refinery CL–Bwana Nkubwa Area, Ndola	**23,750**	**2,280**	....	**^{2}5,040**	**^{2}5,040**	....	....	**^{1}8,100**	....	....	....	**864**	....	....

QUARTERLY COSTIMATING

Nelson indexes change names

Gerald L. Farrar
Contributing Editor

The Nelson refinery cost indexes, which have been published continually in Oil & Gas Journal since 1946, are undergoing a name change. Effective Oct. 1, 1987, the various indexes will be called the Nelson-Farrar indexes.

The initial cost index publication was by the late Dr. Wilbur L. Nelson, professor of petroleum refinery engineering at the University of Tulsa and technical editor of Oil & Gas Journal. The first effort was called the Nelson refinery construction cost index and was not corrected for inflation. This index has had many uses (see accompanying listing).

Dr. Nelson developed the productivity concept, which explains why in a period of refinery construction, cost per bbl of refinery throughput goes down continually. Of particular use has been the equal capability cost index, which predicts equal-capacity replacement costs of a given refinery. The true cost index corrects for average increased capacity of U.S. refineries as time goes by.

In addition to the construction cost indexes, Dr. Nelson also developed the refinery and units' operating indexes.

In 1963, Dr. Nelson and Gerald L. Farrar, then engineering editor of Oil & Gas Journal, began a private relationship in which Farrar made many of the cost calculations. In 1965, Farrar began producing the Nelson indexes and Quarterly costimating. Shortly before his death in 1978, Dr. Nelson transferred ownership of the indexes to Farrar, who has prepared all index material since that time.

The new name will continue to recognize Dr. Nelson for his prestigious work, and it will point out the 24 years' participation and continuing contribution of Gerald L. Farrar. ▪

How and where Nelson indexes have been used

Wages, salary adjustments (many instances)

Bringing pension plans and payments up-to-date (several known instances)

Calculating up-dated costs of refinery construction (many instances. the Irs has accepted nelson index values for this purpose.)

Predicting costs of average equal-capability refineries (many instances)

Predicting costs of average "as-built" refineries—true cost (many instances)

Tracking fuel costs—fuel index (many instances)

Tracking refinery replacement costs (many instances)

Tracking operating costs for refineries (many instances)

Tracking operating costs for refinery units (many instances)

Itemized refining cost indexes

The cost indexes may be used to convert prices at any date to prices at other dates by ratios to the cost indexes of the same date. Item indexes are published each quarter (first week issue of January, April, July, and October). In addition the Nelson Construction and Operating Cost indexes are published in the first issue of each month of The Oil and Gas Journal.

Operating cost (based on 1956 = 100.0):	1954	1972	1984	1985	1986	May, 1987	* References	Index for earlier year in Costimating and Questions on Technology issues
Power, industrial electrical	98.5	131.2	537.2	558.5	567.8	544.3	Code 0543	No. 13, May 19, 1959
Fuel, refinery price	85.5	152.0	921.3	836.2	522.2	516.6	Oil & Gas J.	No. 4, Mar. 17, 1958
Gulf cargoes	85.0	130.4	1288.7	1088.4	601.1	706.5	Oil & Gas J.	No. 4, Mar. 17, 1958
N.Y. barges	82.6	169.6	1123.7	998.4	709.4	664.5	Oil & Gas J.	No. 4, Mar. 17, 1958
Chicago low sulfur			1191.0	1143.2	783.32	646.2	Oil & Gas J.	July 7, 1975
S. Pedro bunkers	84.3	168.1	1260.5	1094.8	514.8	738.9	Oil & Gas J.	No. 4, Mar. 17, 1958
Oklahoma, northern shipments	60.2	128.1	1395.6	1248.1	665.1	615.3	Oil & Gas J.	No. 4, Mar. 17, 1958
Natural gas at wellhead	83.5	190.3	2236.3	2171.1	1901.3	1765.8	Code 531-10-1	No. 4, Mar. 17, 1958
Inorganic chemicals	96.0	123.1	380.4	389.7	383.7	377.6	Code 613	Oct. 5, 1964†
Acid, hydrofluoric	95.5	144.4	407.5	407.5	407.5	407.5	Code 613-0222	Apr. 3, 1963†
Acid, sulfuric	100.0	140.7	352.9	363.3	363.3	363.3	Code 613-0281	No. 94, May 15, 1961
Platinum	92.9	121.1	405.8	283.9	462.2	609.5	Code 1022-02-73	July 5, 1965, p. 117
Sodium carbonate	90.9	119.4	351.0	343.2	339.4	341.2	Code 613-01-03	No. 58, Oct. 12, 1959
Sodium hydroxide	95.5	136.2	359.7	366.7	301.7	316.2	Code 613-01-04	No. 94, May 15, 1961
Sodium phosphate	97.4	107.0	492.5	530.2	530.2	530.2	Code 613-0267	No. 58, Oct. 12, 1959
Organic chemicals	100.0	87.4	339.6	320.2	302.0	320.1	Code 614	Oct. 5, 1964†
Furfural	94.5	137.5	550.0	556.8	576.9	576.9	Chemical Marketing Reporter	No. 58, Oct. 12, 1959
MEK, tank-car lots	82.6	87.5	300.0	300.0	274.0	195.8	Chemical Marketing Reporter	No. 58, Oct. 12, 1959
Phenol	90.4	47.1	213.3	229.3	172.8	277.9	Code 614-0241	No. 58, Oct. 12, 1959
TEL	102.8	101.6	334.8	430.0	516.0	—	Supplier	No. 58, Oct. 12, 1959

Itemized refining cost indexes (continued)

Operating cost (based on 1956 = 100.0):	**1954**	**1972**	**1984**	**1985**	**1986**	**May, 1987**	*** References**	**Index for earlier year in Costimating and Questions on Technology issues**
Operating labor cost (1956 = 100)								
Wages & benefits	88.7	210.0	629.9	642.3	651/9	660.4	Employ & Earn	No. 41, Feb. 16, 1969
Productivity	97.2	197.0	204.5	219.7	253.8	256.3	Employ & Earn	No. 41, Feb. 16, 1969
Construction labor cost (1946 = 100)								
Skilled const.	174.6	499.9	1147.5	1165.0	1192.5	1218.9	Eng. News Record	No. 55, Nov. 3, 1949
Common labor	192.1	630.6	1520.5	1544.5	1584.9	1618.6	Eng. News Record	No. 55, Nov. 3, 1949
Refinery cost	183.3	545.9	1278.1	1297.6	1330.0	1358.8	Oil & Gas J.	May 15, 1967
Equipment or materials (1946 = 100):								
Bubble tray	161.4	324.4	818.3	824.5	817.6	833.1	Computed	July 8, 1962, p. 113
Building materials (nonmetallic)	143.6	212.4	567.7	585.3	592.9	591.7	Code 13	No. 61, Dec. 15, 1949
Brick—building	144.7	252.5	724.4	743.2	771.6	795.4	Code 1342	No. 20, Mer. 3, 1949
Brick—fireclay	193.1	322.8	906.8	928.4	932.8	927.4	Code 135	May 30, 1955†
Castings, iron	188.1	274.9	863.7	871.5	877.0	872.7	Code 1015	Apr. 1, 1963†
Clay products (structural, etc.)	159.1	342.0	592.2	610.5	636.0	655.6	Code 134	No. 20, Mar. 3, 1949
Concrete ingredients	141.1	218.4	561.9	566.3	582.5	590.1	Code 132	No. 22, March 17, 1949
Concrete products	138.5	199.6	492.4	509.4	516.6	517.4	Code 133	Oct. 2, 1967, p. 112
Electrical machinery	159.9	216.3	486.5	497.0	504.6	509.7	Code 117	May 2, 1955†
Motors and generators	157.7	211.0	583.3	601.8	603.8	609.5	Code 1173	May 2, 1955†
Switchgear	171.2	271.0	665.7	676.6	693.7	708.2	Code 1175	May 2, 1955†
Transformers	161.9	149.3	363.1	373.2	376.8	380.7	Code 1174	No. 31, May 19, 1949
Engines (combustion)	150.5	233.3	663.1	666.7	676.9	689.3	Code 1194	No. 36, June 23, 1949
Exchangers (composite)	171.7	274.3	530.9	520.0	524.7	562.8	Manufacturer	Mar. 16, 1964†
Copper base	190.7	266.7	495.5	504.3	515.6	541.8	Manufacturer	Mar. 16, 1964†
Steel	156.8	281.9	555.3	530.7	531.1	577.2	Manufacturer	Mer. 16, 1964†
Fractionating towers	151.0	278.5	674.9	677.7	674.8	677.2	Computed	June 8, 1963, p. 133
Hand tools	173.8	346.5	965.3	1008.3	1032.7	1062.1	Code 1042	June 27, 1955†
Instruments (composite)	154.6	328.4	696.7	713.7	733.3	746.4	Manufacturer	No. 34, June 9, 1949
Insulation (composite)	198.5	272.4	1057.9	1088.8	1057.4	1070.3	Manufacturer	Apr. 3, 1961, p. 193†
Lumber (composite)	197.8	353.4	779.6	756.3	764.9	800.2	Code 81	No. 7, Dec. 2, 1948
Southern pine	181.2	303.9	640.2	599.3	603.8	630.4	Code 811–02	No. 7, Dec. 2, 1948
Redwood, all heart	238.0	310.6	1089.9	1052.4	1024.6	1151.8	Code 811-03-16	July 5, 1965, p. 117
Machinery:								
General purpose	159.9	278.5	714.2	730.8	740.8	747.3	Code 114	Feb. 17, 1949
Construction	165.9	324.4	924.3	935.9	947.0	970.2	Code 112	Apr. 1, 1968, p. 184
Oilfield	161.9	269.1	898.3	900.1	881.2	863.4	Code 1191	Oct. 10, 1955†
Paints—prepared	159.0	231.8	534.3	545.6	552.1	556.6	Code 621	May 16, 1955†
Pipe:								
Gray iron pressure	195.0	346.9	1101.4	1156.9	1179.2	1181.3	Code 1015-0239	Jan. 3, 1983
Standard carbon	182.7	319.9	923.3	937.0	856.0	887.1	Code 1017-0611	Jan. 3, 1983
Pumps, compressors, etc.	166.5	337.5	950.5	969.0	982.6	1008.4	Code 1141	No. 29, May 5, 1949
Steel-mill products	187.1	330.6	927.4	926.4	883.2	895.4	Code 1017	Jan. 3, 1983
Alloy bars	198.7	349.4	896.3	846.7	821.4	816.9	Code 1017-0831	Apr. 1, 1963†
Cold-rolled sheets	187.0	365.5	1027.2	1023.3	952.8	982.6	Code 1017-0711	Jan. 3, 1983
Alloy sheets	177.0	225.9	472.6	479.3	470.8	461.2	Code 1017-0733	Jan. 3, 1983
Stainless strip	169.0	221.2	495.2	479.3	487.9	490.1	Code 1017-0755	Jan. 3, 1983
Structural carbon, plates	193.4	386.7	1048.4	1047.5	968.4	981.9	Code 1017-0400	Jan. 3, 1983
Seamless carbon tubing	199.4	347.3	865.8	882.8	774.0	769.7	Code 1017-0621	Jan. 3, 1983
Welded carbon tubing	180.0	265.5	929.6	936.5	936.5	951.9	Code 1017-0622	Jan. 3, 1983
Tanks and pressure vessels	147.3	246.4	589.9	587.8	582.6	576.4	Code 1072	No. 5, Nov. 18, 1949
Tube stills	123.0	125.3	339.0	340.5	331.0	335.7	Computed	Oct. 1, 1962†
Valves and fittings	197.0	350.9	966.3	992.9	1007.5	1015.3	Code 11-49-01	No. 46, Sept. 1, 1940
Nelson-Farrar Refinery (Inflation Index)	179.8	438.5	1061.0	1074.4	1088.9	1110.9	Oil & Gas J.	May 15, 1969
Nelson-Farrar Refinery Operation (1956)	88.7	118.5	417.4	406.8	369.0	370.8	Oil & Gas J.	No. 2, Mar. 3, 1958
Nelson-Farrar Refinery Process Operation (1956)	88.4	147.0	584.2	551.7	330.8	431.4	Oil & Gas J.	No. 2, Mar. 3, 1958

*Code refers to the index number of the Bureau of Statistics, U.S. Department of Labor, "Wholesale Prices." †Itemized Cost Indexes, Oil & Gas Journal.

NELSON-FARRAR COST INDEX

Refinery construction (1946 basis)

(Explained on p. 145 of the issue of Dec. 30, 1985)

	1962	1973	1984	1985	1986	July, 1986	June, 1987	July, 1987
Pumps, compressors, etc.	222.5	346.9	950.5	969.9	982.6	984.8	995.4	998.4
Electrical machinery	189.5	220.2	486.5	497.0	504.6	505.8	508.5	512.0
Internal-comb. engines	183.4	238.3	663.1	666.7	676.9	680.3	689.3	689.9
Instruments	214.8	338.0	696.8	713.7	733.3	732.3	739.5	757.4
Heat exchangers	183.6	313.7	530.9	520.0	524.7	518.0	562.8	577.1
Misc. equip. average	198.8	291.4	665.6	673.4	684.4	684.2	699.1	707.6
Materials component	205.9	292.3	735.3	739.6	730.0	729.6	746.1	744.4
Labor component	258.8	585.2	1,278.1	1,297.6	1330.0	1,344.9	1,365.4	1,371.0
Nelson Refinery (Inflation) Index	237.6	468.0	1,061.0	1,074.4	1,089.9	1,098.8	1,115.6	1,120.3

Refinery operating (1956 basis)

(Explained on p. 145 of the issue of Dec. 30, 1985)

	1962	1973	1984	1985	1986	July, 1986	June, 1987	July, 1987
Fuel cost	100.9	186.8	968.3	878.9	548.8	454.2	583.8	599.8
Labor cost	93.9	102.9	308.0	293.4	259.4	251.0	245.7	250.6
Wages	123.9	221.2	629.9	642.3	651.8	647.4	651.5	678.5
Productivity	131.8	214.9	204.5	219.7	253.8	257.9	265.1	270.7
Invest., maint., etc.	121.7	193.0	436.6	445.8	460.0	463.6	470.7	472.7
Chemical costs	96.7	117.3	233.4	222.9	206.7	204.3	197.7	196.4
Nelson operating indexes								
Refinery	103.7	125.7	417.4	406.8	369.0	358.6	370.8	374.9
Process units[*]	103.6	168.0	584.2	551.7	430.8	396.5	442.8	450.6

[*] Add separate index(es) for chemicals, if any are used. See current Quarterly Costimating, first issue, months of January, April, July, and October.

These indexes are published in the first issue of each month. They are compiled by Gerald L. Farrar, Journal Contributing Editor.

Indexes of selected individual items of equipment and materials are also published on the Costimating page in the first issue of the months of January, April, July, and October.

Hughes rig count

	1-26-87	1-27-86
Alabama	6	22
Alaska	8	21
Arkansas	5	17
Arizona	0	0
California	46	64
Land	38	54
Offshore	8	10
Colorado	23	52
Florida	4	6
Illinois	3	17
Indiana	1	2
Kansas	37	77
Kentucky	2	2
Louisiana	127	236
North	16	22
S. Inland Waters	20	32
S. Land	32	69
Offshore	59	113
Maryland	0	0
Michigan	27	46
Mississippi	9	23
Montana	7	21
Nebraska	5	7
New Mexico	27	54
New York	1	2
North Dakota	8	39
Ohio	37	27
Oklahoma	116	235
Pennsylvania	17	22
South Dakota	1	1
Texas	279	560
Offshore	18	36
Inland Waters	1	4
Dist. 1 & 4	40	62
Dist. 2 & 3	35	79
Dist. 5 & 6	38	75
Dist. 7B & 9	27	61
Dist. 7C,8 & 8A	100	218
Dist. 10	20	25
Utah	5	25
West Virginia	15	13
Wyoming	18	71
Others–Nv.-1,Va.-2	3	9
Total U.S.	**837**	**1,671**
Cum. Avg. to Date	**900**	**1,809**
Canada	177	460
Canada-Offshore	1	6
Grand Total	**1,015**	**2,137**

Rotary rigs from spudding in to total depth

Source: Hughes Tool Co.
Data available in Oil & Gas Journal Energy Database.

Hughes rig count

	3-30-87	3-31-86
Alabama	7	10
Alaska	7	17
Arkansas	8	14
Arizona	0	0
California	55	57
Land	47	49
Offshore	8	8
Colorado	20	24
Florida	1	2
Illinois	2	2
Indiana	1	1
Kansas	33	50
Kentucky	0	2
Louisiana	109	157
N. Land	14	12
S. Inland Waters	17	16
S. Land	27	43
Offshore	51	86
Maryland	0	0
Michigan	14	18
Mississippi	11	21
Montana	6	12
Nebraska	2	3
New Mexico	32	38
New York	0	1
North Dakota	5	8
Ohio	6	7
Oklahoma	119	169
Pennsylvania	12	17
South Dakota	0	0
Texas	262	342
Offshore	15	19
Inland Waters	2	4
Dist. 1 & 4	37	48
Dist. 2 & 3	35	49
Dist. 5 & 6	32	58
Dist. 7B & 9	31	34
Dist. 7C,8 & 8A	92	116
Dist. 10	18	14
Utah	3	6
West Virginia	12	14
Wyoming	21	30
Others	0	12
Total U.S.	**748**	**1,034**
Cum. Avg. to Date	**825**	**1,439**
Canada	130	219
Canada-Offshore	1	3
Grand Total	**879**	**1,256**

Rotary rigs from spudding in to total depth

Source: Hughes Tool Co.
Data available in Oil & Gas Journal Energy Database.

Baker Hughes rig count

	5-26-87	5-27-86
Alabama	6	9
Alaska	6	12
Arkansas	11	6
Arizona	0	0
California	61	41
Land	56	35
Offshore	5	6
Colorado	17	10
Florida	0	2
Illinois	3	6
Indiana	0	1
Kansas	44	38
Kentucky	0	2
Louisiana	113	110
N. Land	5	7
S. Inland Waters	18	16
S. Land	29	33
Offshore	61	54
Maryland	0	0
Michigan	18	23
Mississippi	13	17
Montana	5	6
Nebraska	5	1
New Mexico	23	18
New York	1	3
North Dakota	8	4
Ohio	6	9
Oklahoma	117	114
Pennsylvania	10	11
South Dakota	0	0
Texas	253	234
Offshore	17	20
Inland Waters	0	3
Dist. 1 & 4	43	30
Dist. 2 & 3	32	38
Dist. 5 & 6	31	32
Dist. 7B & 9	22	36
Dist. 7C,8 & 8A	95	65
Dist. 10	13	10
Utah	6	6
West Virginia	8	9
Wyoming	20	22
Others–Ia.-1,Nv.-1, Va.-4	6	15
Total U.S.	**762**	**729**
Cum. Avg. to Date	**800**	**1,212**
Canada	80	36
Canada-Offshore	1	7
Grand Total	**843**	**772**

Rotary rigs from spudding in to total depth

Source: Baker Hughes Inc.
Data available in Oil & Gas Journal Energy Database.

Hughes rig count

	2-23-87	2-24-86
Alabama	6	19
Alaska	8	23
Arkansas	9	19
Arizona	0	0
California	44	60
Land	36	49
Offshore	8	11
Colorado	15	34
Florida	3	4
Illinois	6	6
Indiana	2	1
Kansas	42	57
Kentucky	0	2
Louisiana	104	201
North	8	8
S. Inland Waters	17	28
S. Land	34	58
Offshore	45	107
Maryland	0	0
Michigan	31	41
Mississippi	10	20
Montana	8	18
Nebraska	5	5
New Mexico	34	38
New York	1	1
North Dakota	8	17
Ohio	42	15
Oklahoma	124	180
Pennsylvania	19	28
South Dakota	0	0
Texas	274	436
Offshore	19	25
Inland Waters	1	3
Dist. 1 & 4	47	60
Dist. 2 & 3	36	59
Dist. 5 & 6	37	61
Dist. 7B & 9	21	41
Dist. 7C,8 & 8A	90	170
Dist. 10	23	17
Utah	2	17
West Virginia	20	9
Wyoming	20	47
Others–Nv.-2	2	12
Total U.S.	**839**	**1,308**
Cum. Avg. to Date	**859**	**1,626**
Canada	149	440
Canada-Offshore	1	8
Grand Total	**989**	**1,756**

Rotary rigs from spudding in to total depth

Source: Hughes Tool Co.
Data available in Oil & Gas Journal Energy Database.

Baker Hughes rig count

	4-27-87	4-28-86
Alabama	8	13
Alaska	7	16
Arkansas	8	8
Arizona	0	0
California	54	48
Land	47	39
Offshore	7	9
Colorado	16	15
Florida	0	1
Illinois	2	6
Indiana	1	1
Kansas	46	44
Kentucky	0	3
Louisiana	104	131
N. Land	9	5
S. Inland Waters	18	16
S. Land	31	42
Offshore	46	68
Maryland	0	0
Michigan	20	24
Mississippi	12	21
Montana	4	7
Nebraska	3	3
New Mexico	23	25
New York	2	1
North Dakota	6	4
Ohio	7	6
Oklahoma	131	142
Pennsylvania	6	2
South Dakota	0	0
Texas	256	285
Offshore	16	23
Inland Waters	0	3
Dist. 1 & 4	40	25
Dist. 2 & 3	42	48
Dist. 5 & 6	34	50
Dist. 7B & 9	22	32
Dist. 7C,8 & 8A	89	85
Dist. 10	13	19
Utah	3	5
West Virginia	8	6
Wyoming	33	25
Others–Ia.-1,Nv.-2, Va.-2	5	13
Total U.S.	**765**	**855**
Cum. Avg. to Date	**808**	**1,313**
Canada	39	33
Canada-Offshore	2	6
Grand Total	**806**	**894**

Rotary rigs from spudding in to total depth

Source: Baker Hughes Inc.
Data available in Oil & Gas Journal Energy Database.

Baker Hughes rig count

	6-29-87	6-30-86
Alabama	8	9
Alaska	9	18
Arkansas	8	6
Arizona	0	0
California	60	39
Land	54	37
Offshore	6	2
Colorado	23	14
Florida	4	2
Illinois	4	5
Indiana	0	1
Kansas	43	40
Kentucky	1	3
Louisiana	112	98
N. Land	9	6
S. Inland Waters	24	14
S. Land	23	37
Offshore	56	41
Maryland	0	0
Michigan	20	17
Mississippi	6	14
Montana	6	4
Nebraska	7	3
New Mexico	32	16
New York	1	2
North Dakota	16	8
Ohio	12	11
Oklahoma	115	98
Pennsylvania	19	15
South Dakota	2	0
Texas	256	224
Offshore	17	16
Inland Waters	1	2
Dist. 1 & 4	45	26
Dist. 2 & 3	34	33
Dist. 5 & 6	27	31
Dist. 7B & 9	23	30
Dist. 7C,8 & 8A	94	75
Dist. 10	15	11
Utah	5	8
West Virginia	12	13
Wyoming	28	18
Others–Ia.-1,Nv.-1, Va.-2	4	11
Total U.S.	**813**	**697**
Cum. Avg. to Date	**797**	**1,114**
Canada	144	68
Canada-Offshore	3	6
Grand Total	**960**	**771**

Rotary rigs from spudding in to total depth

Source: Baker Hughes Inc.
Data available in Oil & Gas Journal Energy Database.

Baker Hughes rig count

	7-27-87	7-28-86
Alabama	10	7
Alaska	9	10
Arkansas	7	7
Arizona	0	0
California	55	34
Land	48	33
Offshore	7	1
Colorado	26	13
Florida	4	2
Illinois	3	4
Indiana	0	0
Kansas	56	39
Kentucky	3	2
Louisiana	152	109
N. Land	13	10
S. Inland Waters	26	18
S. Land	41	34
Offshore	72	47
Maryland	0	0
Michigan	21	17
Mississippi	13	16
Montana	8	3
Nebraska	8	2
New Mexico	37	15
New York	1	1
North Dakota	14	8
Ohio	13	15
Oklahoma	133	117
Pennsylvania	12	15
South Dakota	0	0
Texas	272	230
Offshore	19	15
Inland Waters	1	1
Dist. 1 & 4	53	27
Dist. 2 & 3	40	39
Dist. 5 & 6	32	36
Dist. 7B & 9	21	32
Dist. 7C,8 & 8A	95	73
Dist. 10	11	7
Utah	8	7
West Virginia	11	15
Wyoming	36	18
Others–Ia.-1,Nv.-1, Va.-3	5	10
Total U.S.	**917**	**716**
Cum. Avg. to Date	**811**	**1,057**
Canada	176	63
Canada-Offshore	3	6
Grand Total	**1,096**	**785**

Source: Baker Hughes Inc.
Data available in Oil & Gas Journal Energy Database.

Rotary rigs from spudding in to total depth

Baker Hughes rig count

	8-31-87	9-1-86
Alabama	9	6
Alaska	9	10
Arkansas	12	14
California	75	33
Land	68	33
Offshore	7	0
Colorado	23	27
Florida	3	0
Illinois	3	4
Indiana	0	0
Kansas	57	33
Kentucky	3	1
Louisiana	160	119
N. Land	15	15
S. Inland Waters	24	16
S. Land	39	26
Offshore	82	60
Maryland	0	0
Michigan	18	21
Mississippi	15	12
Montana	11	4
Nebraska	7	2
New Mexico	32	19
New York	3	3
North Dakota	16	15
Ohio	16	12
Oklahoma	159	101
Pennsylvania	20	20
South Dakota	1	0
Texas	313	216
Offshore	18	12
Inland Waters	1	2
Dist. 1	5	3
Dist. 2	16	8
Dist. 3	33	24
Dist. 4	44	22
Dist. 5	17	16
Dist. 6	30	25
Dist. 7B	11	11
Dist. 7C	24	11
Dist. 8	50	33
Dist. 8A	38	23
Dist. 9	8	17
Dist. 10	18	9
Utah	10	12
West Virginia	12	17
Wyoming	52	22
Others, Az.-1,Ia.-1,Nv.-3, Or.-1,Va.-3,Wa.-1	10	8
Total U.S.	**1,049**	**731**
Cum. Avg. to Date	**838**	**1,010**
Canada	204	111
Canada-Offshore	3	2
Grand Total	**1,256**	**844**

Source: Baker Hughes Inc.
Data available in Oil & Gas Journal Energy Databasa.

Rotary rigs from spudding in to total depth

Baker Hughes rig count

	9-28-87	9-29-86
Alabama	18	7
Alaska	9	8
Arkansas	4	5
California	78	48
Land	73	45
Offshore	5	3
Colorado	26	18
Florida	4	1
Illinois	3	2
Indiana	0	2
Kansas	65	50
Kentucky	2	2
Louisiana	152	122
N. Land	14	15
S. Inland Waters	20	18
S. Land	44	33
Offshore	74	56
Maryland	0	0
Michigan	23	20
Mississippi	20	7
Montana	12	5
Nebraska	9	2
New Mexico	30	21
New York	2	2
North Dakota	18	15
Ohio	16	22
Oklahoma	146	117
Pennsylvania	28	20
South Dakota	0	0
Texas	322	256
Offshore	22	14
Inland Waters	1	2
Dist. 1	5	5
Dist. 2	17	12
Dist. 3	32	21
Dist. 4	45	32
Dist. 5	11	12
Dist. 6	25	31
Dist. 7B	13	19
Dist. 7C	25	14
Dist. 8	57	38
Dist. 8A	46	21
Dist. 9	10	16
Dist. 10	13	19
Utah	8	10
West Virginia	17	14
Wyoming	73	23
Others, Az.-1,Id.-1,ia.-1, Nv.-1,Or.-1,Va.-3,Wa.-1	9	7
Total U.S.	**1,094**	**806**
Cum. Avg. to Date	**865**	**985**
Canada	244	109
Canada-Offshore	2	1
Grand Total	**1,340**	**916**

Source: Baker Hughes Inc.
Data available in Oil & Gas Journal Energy Database.

Rotary rigs from spudding in to total depth

Baker Hughes rig count

	10-26-87	10-27-86
Alabama	19	12
Alaska	9	8
Arkansas	13	8
California	74	51
Land	69	48
Offshore	5	3
Colorado	33	16
Florida	4	2
Illinois	3	2
Indiana	0	2
Kansas	47	48
Kentucky	3	3
Louisiana	162	125
N. Land	11	12
S. Inland Waters	30	20
S. Land	42	34
Offshore	79	59
Maryland	0	0
Michigan	24	21
Mississippi	15	8
Montana	14	9
Nebraska	5	2
New Mexico	39	26
New York	4	3
North Dakota	24	12
Ohio	19	21
Oklahoma	149	110
Pennsylvania	20	23
South Dakota	0	1
Texas	350	242
Offshore	25	14
Inland Waters	3	2
Dist. 1	5	4
Dist. 2	22	12
Dist. 3	33	18
Dist. 4	33	38
Dist. 5	15	18
Dist. 6	27	22
Dist. 7B	12	16
Dist. 7C	26	11
Dist. 8	71	35
Dist. 8A	50	20
Dist. 9	10	11
Dist. 10	18	21
Utah	8	10
West Virginia	17	21
Wyoming	67	32
Others, Az.-1,Id.-1,Nv.-1, Or.-1,Va.-3,Wa.-1	8	11
Total U.S.	**1,130**	**829**
Cum. Avg. to Date	**889**	**969**
Canada	313	126
Canada-Offshore	1	2
Grand Total	**1,444**	**957**

Source: Baker Hughes Inc.
Data available in Oil & Gas Journal Energy Database.

Rotary rigs from spudding in to total depth

Baker Hughes rig count

	11-30-87	12-1-86
Alabama	15	8
Alaska	12	8
Arkansas	15	7
California	69	55
Land	63	51
Offshore	6	4
Colorado	42	25
Florida	3	0
Illinois	4	2
Indiana	0	2
Kansas	58	48
Kentucky	6	3
Louisiana	169	115
N. Land	12	10
S. Inland Waters	33	18
S. Land	39	29
Offshore	85	58
Maryland	0	0
Michigan	20	19
Mississippi	19	8
Montana	12	15
Nebraska	8	3
New Mexico	58	28
New York	3	4
North Dakota	21	15
Ohio	26	21
Oklahoma	149	140
Pennsylvania	22	22
South Dakota	1	2
Texas	340	324
Offshore	21	17
Inland Waters	2	2
Dist. 1	6	1
Dist. 2	19	13
Dist. 3	34	24
Dist. 4	38	47
Dist. 5	14	19
Dist. 6	24	21
Dist. 7B	12	17
Dist. 7C	24	16
Dist. 8	70	69
Dist. 8A	47	33
Dist. 9	8	22
Dist. 10	21	23
Utah	10	11
West Virginia	13	19
Wyoming	58	40
Others, Id.-2,Nv.-2, Or.-1,Va.-2,Wa.-1	8	10
Total U.S.	**1,161**	**954**
Cum. Avg. to Date	**917**	**963**
Canada	209	151
Canada-Offshore	3	1
Grand Total	**1,373**	**1,106**

Source: Baker Hughes Inc.
Data available in Oil & Gas Journal Energy Database

Rotary rigs from spudding in to total depth

Baker Hughes rig count

	12-28-87	12-29-86
Alabama	20	6
Alaska	12	6
Arkansas	16	7
California	62	52
Land	55	45
Offshore	7	7
Colorado	40	24
Florida	6	2
Illinois	6	3
Indiana	0	2
Kansas	47	51
Kentucky	5	1
Louisiana	184	128
N. Land	10	7
S. Inland Waters	34	22
S. Land	49	37
Offshore	91	62
Maryland	0	0
Michigan	20	26
Mississippi	18	10
Montana	8	10
Nebraska	4	4
New Mexico	53	34
New York	5	4
North Dakota	21	10
Ohio	30	26
Oklahoma	142	150
Pennsylvania	21	24
South Dakota	2	1
Texas	335	318
Offshore	18	22
Inland Waters	1	2
Dist. 1	0	5
Dist. 2	13	15
Dist. 3	29	23
Dist. 4	40	45
Dist. 5	14	13
Dist. 6	28	22
Dist. 7B	17	19
Dist. 7C	25	15
Dist. 8	77	69
Dist. 8A	42	33
Dist. 9	12	14
Dist. 10	19	21
Utah	15	11
West Virginia	14	24
Wyoming	52	45
Others, Id.-1,Mo.-1, Nv.-1,Va.-3,Wa.-1	7	9
Total U.S.	**1,145**	**988**
Cum. Avg. to Date	**936**	**963**
Canada	186	344
Canada-Offshore	2	1
Grand Total	**1,333**	**1,333**

Source: Baker Hughes Inc.
Data available in Oil & Gas Journal Energy Database.

Rotary rigs from spudding in to total depth

Smith rig count

Proposed depth (feet)	1-23-87		1-24-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	26	38.5	51	54.9
2,501- 5,000	157	88.5	316	88.0
5,001- 7,500	162	80.9	352	71.0
7,501-10,000	198	63.6	388	64.4
10,001-12,500	190	51.6	324	47.8
12,501-15,000	98	37.8	223	32.3
15,001-17,500	59	39.0	84	15.5
17,501-20,000	24	33.3	59	8.5
20,001-over	8	12.5	20	5.0
Total	**922**	**62.1**	**1,827**	**58.0**
INLAND	21		42	
LAND	823		1,595	
OFFSHORE	78		190	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	4-24-87		4-25-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	30	26.7	29	41.4
2,501- 5,000	145	87.6	155	80.0
5,001- 7,500	177	72.3	152	68.4
7,501-10,000	189	61.4	189	58.7
10,001-12,500	141	48.9	185	40.0
12,501-15,000	89	41.6	114	28.9
15,001-17,500	47	40.4	48	18.8
17,501-20,000	23	8.7	33	12.1
20,001-over	10	20.0	19	—
Total	**851**	**59.7**	**924**	**51.0**
INLAND	23		18	
LAND	754		785	
OFFSHORE	74		121	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	7-24-87		7-25-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	33	54.5	23	43.5
2,501- 5,000	185	82.7	162	84.0
5,001- 7,500	206	76.2	164	78.0
7,501-10,000	245	63.3	151	63.6
10,001-12,500	159	46.5	147	44.9
12,501-15,000	123	37.4	94	40.4
15,001-17,500	63	28.6	34	38.2
17,501-20,000	34	17.6	24	16.7
20,001-over	5	—	13	—
Total	**1,053**	**59.5**	**812**	**60.5**
INLAND	34		23	
LAND	912		715	
OFFSHORE	107		74	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	10-23-87		10-24-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	37	37.8	32	40.6
2,501- 5,000	243	85.2	216	91.2
5,001- 7,500	259	73.0	177	81.9
7,501-10,000	278	61.2	190	62.1
10,001-12,500	235	48.5	171	47.4
12,501-15,000	148	37.2	89	46.1
15,001-17,500	88	23.9	37	37.8
17,501-20,000	36	25.0	15	40.0
20,001-over	8	—	5	—
Total	**1,332**	**58.5**	**932**	**66.0**
INLAND	29		20	
LAND	1,165		841	
OFFSHORE	138		71	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	2-27-87		2-28-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	15	26.7	53	47.2
2,501- 5,000	151	88.1	215	83.7
5,001- 7,500	142	75.4	263	74.5
7,501-10,000	186	66.1	295	61.4
10,001-12,500	155	42.6	277	43.0
12,501-15,000	90	34.4	176	23.9
15,001-17,500	60	38.3	75	18.7
17,501-20,000	24	33.3	42	14.3
20,001-over	7	14.3	17	5.9
Total	**830**	**59.8**	**1,413**	**54.1**
INLAND	16		33	
LAND	732		1,214	
OFFSHORE	82		166	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	5-22-87		5-23-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	28	39.3	38	50.0
2,501- 5,000	163	86.5	150	89.3
5,001- 7,500	187	75.9	155	74.8
7,501-10,000	193	53.9	178	57.3
10,001-12,500	149	51.7	127	41.7
12,501-15,000	97	39.2	105	31.4
15,001-17,500	47	31.9	37	18.9
17,501-20,000	26	3.8	28	10.7
20,001-over	6	—	19	—
Total	**896**	**59.0**	**837**	**55.8**
INLAND	20		20	
LAND	790		716	
OFFSHORE	86		101	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	8-28-87		8-29-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	37	43.2	24	45.8
2,501- 5,000	209	82.8	146	86.3
5,001- 7,500	238	75.6	161	77.0
7,501-10,000	279	61.6	169	62.7
10,001-12,500	185	44.3	145	53.8
12,501-15,000	130	33.1	91	30.8
15,001-17,500	72	34.7	38	28.9
17,501-20,000	37	13.5	17	23.5
20,001-over	5	—	8	—
Total	**1,192**	**58.4**	**799**	**61.1**
INLAND	30		20	
LAND	1,048		707	
OFFSHORE	114		72	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	11-27-87		11-28-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	27	44.4	28	25.0
2,501- 5,000	232	83.6	199	87.9
5,001- 7,500	244	71.7	220	76.8
7,501-10,000	301	64.8	234	70.9
10,001-12,500	221	46.6	195	47.7
12,501-15,000	157	31.8	100	38.0
15,001-17,500	74	28.4	52	38.5
17,501-20,000	39	30.8	17	35.3
20,001-over	9	—	8	12.5
Total	**1,304**	**58.4**	**1,053**	**64.1**
INLAND	29		22	
LAND	1,124		939	
OFFSHORE	151		92	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	3-27-87		3-28-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	17	41.2	37	51.4
2,501- 5,000	120	85.0	188	84.6
5,001- 7,500	179	81.0	203	67.5
7,501-10,000	188	62.2	236	60.6
10,001-12,500	150	47.3	219	42.5
12,501-15,000	83	36.1	141	21.3
15,001-17,500	48	37.5	51	15.7
17,501-20,000	22	13.6	33	15.2
20,001-over	9	11.1	19	—
Total	**816**	**60.5**	**1,127**	**52.7**
INLAND	21		23	
LAND	718		973	
OFFSHORE	77		131	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	6-26-87		6-27-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	37	45.9	32	59.4
2,501- 5,000	188	86.2	148	89.9
5,001- 7,500	182	80.2	127	74.8
7,501-10,000	243	60.5	142	59.9
10,001-12,500	142	45.1	127	44.1
12,501-15,000	106	38.7	99	37.4
15,001-17,500	46	28.3	34	38.2
17,501-20,000	26	11.5	24	20.8
20,001-over	4	—	15	—
Total	**974**	**60.9**	**748**	**59.2**
INLAND	25		19	
LAND	847		651	
OFFSHORE	102		78	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	9-25-87		9-26-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	38	42.1	20	40.0
2,501- 5,000	245	83.7	174	88.5
5,001- 7,500	243	76.5	185	83.2
7,501-10,000	277	64.6	174	62.1
10,001-12,500	214	50.5	170	46.5
12,501-15,000	131	36.6	90	32.2
15,001-17,500	83	27.7	40	30.0
17,501-20,000	35	14.3	18	27.8
20,001-over	9	—	7	—
Total	**1,275**	**60.4**	**878**	**62.5**
INLAND	29		22	
LAND	1,117		784	
OFFSHORE	129		72	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

Smith rig count

Proposed depth (feet)	12-18-87		12-19-86	
	Rig count	% footage*	Rig count	% footage*
0- 2,500	35	40.0	36	33.3
2,501- 5,000	246	82.9	225	88.0
5,001- 7,500	255	72.9	236	79.7
7,501-10,000	283	64.7	231	68.0
10,001-12,500	238	52.5	193	49.7
12,501-15,000	164	35.4	99	40.4
15,001-17,500	81	24.7	58	25.9
17,501-20,000	40	30.0	20	25.0
20,001-over	9	11.1	8	25.0
Total	**1,351**	**59.4**	**1,106**	**64.5**
INLAND	32		22	
LAND	1,163		996	
OFFSHORE	156		88	

* Rigs employed under footage contracts.
Definitions, see OGJ 3/19/84, p. 138.
Source: Smith International Inc.
Data available in Oil & Gas Journal Energy Database.

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	1-23-87*	1-24-86†
Alabama	56	63
Alaska	1,880	1,866
California	1,078	1,168
Colorado	72	81
Florida	19	30
Illinois	78	81
Kansas	160	214
Louisiana	1,365	1,439
Michigan	65	80
Mississippi	78	84

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	1-23-87*	1-24-86†
Montana	71	81
New Mexico	194	218
North Dakota	113	132
Oklahoma	361	451
Texas	2,165	2,444
Utah	93	118
Wyoming	315	339
All others	183	183
Total	**8,346**	**9,072**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	3-27-87*	3-28-86†
Alabama	54	63
Alaska	1,875	1,860
California	1,078	1,163
Colorado	72	80
Florida	24	28
Illinois	75	81
Kansas	165	199
Louisiana	1,340	1,444
Michigan	67	83
Mississippi	77	83

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	3-27-87*	3-28-86†
Montana	72	78
New Mexico	200	216
North Dakota	120	131
Oklahoma	366	426
Texas	2,142	2,419
Utah	99	114
Wyoming	319	342
All others	175	156
Total	**8,320**	**8,966**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	5-22-87*	5-23-86†
Alabama	56	59
Alaska	1,895	1,905
California	1,079	1,151
Colorado	73	79
Florida	23	29
Illinois	74	75
Kansas	165	182
Louisiana	1,343	1,417
Michigan	68	72
Mississippi	79	83

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	5-22-87*	5-23-86†
Montana	73	77
New Mexico	202	209
North Dakota	119	129
Oklahoma	369	405
Texas	2,138	2,320
Utah	105	112
Wyoming	319	328
All others	172	180
Total	**8,352**	**8,812**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	7-24-87*	7-25-86†
Alabama	56	57
Alaska	1,930	1,901
California	1,097	1,110
Colorado	73	79
Florida	23	26
Illinois	74	72
Kansas	165	183
Louisiana	1,340	1,400
Michigan	68	71
Mississippi	78	81

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	7-24-87*	7-25-86†
Montana	73	73
New Mexico	198	207
North Dakota	119	123
Oklahoma	362	400
Texas	2,157	2,270
Utah	103	103
Wyoming	319	331
All others	172	167
Total	**8,407**	**8,654**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	9-25-87*	9-26-86†
Alabama	58	56
Alaska	1,900	1,788
California	1,095	1,068
Colorado	75	77
Florida	22	20
Illinois	68	71
Kansas	155	173
Louisiana	1,335	1,366
Michigan	65	67
Mississippi	78	82

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	9-25-87*	9-26-86†
Montana	70	72
New Mexico	195	198
North Dakota	113	118
Oklahoma	342	385
Texas	2,125	2,220
Utah	92	100
Wyoming	290	320
All others	153	157
Total	**8,231**	**8,338**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	11-27-87*	11-28-86†
Alabama	58	54
Alaska	1,905	1,883
California	1,095	1,065
Colorado	75	77
Florida	22	24
Illinois	64	63
Kansas	154	161
Louisiana	1,320	1,377
Michigan	65	68
Mississippi	78	82

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	11-27-87*	11-28-86†
Montana	68	70
New Mexico	191	201
North Dakota	113	120
Oklahoma	340	370
Texas	2,075	2,211
Utah	89	106
Wyoming	300	319
All others	150	161
Total	**8,162**	**8,412**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	2-27-87*	2-28-85†
Alabama	56	63
Alaska	1,870	1,907
California	1,082	1,162
Colorado	72	80
Florida	19	29
Illinois	78	97
Kansas	158	204
Louisiana	1,370	1,464
Michigan	65	83
Mississippi	78	85

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	2-27-87*	2-28-86†
Montana	71	82
New Mexico	194	219
North Dakota	113	134
Oklahoma	365	439
Texas	2,145	2,390
Utah	92	119
Wyoming	330	342
All others	183	189
Total	**8,341**	**9,088**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	4-24-87*	4-25-86†
Alabama	55	61
Alaska	1,890	1,841
California	1,075	1,153
Colorado	73	79
Florida	24	28
Illinois	73	79
Kansas	166	196
Louisiana	1,340	1,427
Michigan	68	75
Mississippi	79	84

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	4-24-87*	4-25-86†
Montana	73	80
New Mexico	200	210
North Dakota	120	130
Oklahoma	367	416
Texas	2,138	2,377
Utah	103	113
Wyoming	319	331
All others	172	181
Total	**8,335**	**8,861**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	6-26-87*	6-27-86†
Alabama	56	57
Alaska	1,920	1,894
California	1,095	1,152-
Colorado	73	78
Florida	23	27
Illinois	74	73
Kansas	165	183
Louisiana	1,348	1,381
Michigan	68	72
Mississippi	78	81

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	6-26-87*	6-27-86†
Montana	73	74
New Mexico	196	209
North Dakota	118	126
Oklahoma	372	376
Texas	2,155	2,278
Utah	103	101
Wyoming	319	328
All others	172	175
Total	**8,408**	**8,665**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	8-28-87*	8-29-86†
Alabama	56	58
Alaska	1,920	1,811
California	1,100	1,071
Colorado	74	78
Florida	22	24
Illinois	71	65
Kansas	160	167
Louisiana	1,340	1,367
Michigan	67	69
Mississippi	78	82

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	8-28-87*	8-29-86†
Montana	71	72
New Mexico	200	198
North Dakota	119	120
Oklahoma	348	375
Texas	2,128	2,231
Utah	100	102
Wyoming	292	324
All others	162	160
Total	**8,308**	**8,374**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	10-23-87*	10-24-86†
Alabama	58	51
Alaska	1,920	1,891
California	1,096	1,066
Colorado	75	78
Florida	23	21
Illinois	65	71
Kansas	155	167
Louisiana	1,325	1,332
Michigan	65	69
Mississippi	78	81

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	10-23-87*	10-24-86†
Montana	68	71
New Mexico	192	202
North Dakota	113	118
Oklahoma	340	386
Texas	2,090	2,210
Utah	90	101
Wyoming	300	321
All others	151	162
Total	**8,204**	**8,398**

*OGJ estimate †Revised

OGJ production report

Crude oil and lease condensate
(1,000 b/d)

	12-25-87*	12-26-86†
Alabama	58	55
Alaska	1,950	1,822
California	1,098	1,071
Colorado	75	77
Florida	22	22
Illinois	65	67
Kansas	163	168
Louisiana	1,295	1,386
Michigan	65	66
Mississippi	77	78

Source: Oil & Gas Journal
Data available in Oil & Gas Journal Energy Database.

	12-25-87*	12-26-86†
Montana	67	70
New Mexico	193	199
North Dakota	112	119
Oklahoma	355	388
Texas	2,073	2,206
Utah	95	101
Wyoming	300	303
All others	157	163
Total	**8,220**	**8,361**

*OGJ estimate †Revised

API refinery report—January 23, 1987

District	Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Motor gasoline Total	Motor gasoline Leaded*	Motor gasoline Unleaded*	Jet fuel Naphtha	Jet fuel Kero	Fuel oils Distillate	Fuel oils Residual
	Refinery operations (Thousands of barrels daily)					Refinery output (Thousands of barrels daily)						
East coast	1,227	1,048	1,069	1,346	79.4	675	139	536	20	54	339	145
App. Dist. 1	100	90	90	108	83.3	46	14	32	—	—	25	8
Dist. 1 total	**1,327**	**1,138**	**1,159**	**1,454**	**79.7**	**721**	**153**	**568**	**20**	**54**	**364**	**153**
App. Dist. 2	60	55	55	66	83.3	37	13	24	—	—	11	3
Ind., Ill., Ky.	1,954	1,835	1,876	2,210	84.9	1,091	214	877	9	144	380	75
Minn., Wis., Dak.	299	282	283	322	87.9	176	57	119	4	19	63	29
Okla., Kan., Mo.	630	612	631	726	86.9	390	155	235	5	34	152	9
Dist. 2 total	**2,943**	**2,784**	**2,845**	**3,324**	**85.6**	**1,694**	**439**	**1,255**	**18**	**197**	**606**	**116**
Inland Texas	534	458	482	568	84.9	288	81	207	22	30	105	19
Texas Gulf coast	3,227	2,855	2,893	3,738	77.4	1,456	354	1,102	26	277	667	234
La. Gulf Coast	2,383	2,274	2,305	2,578	89.4	1,088	238	850	14	312	507	106
N. La. and Ark.	185	172	180	258	69.8	59	12	47	7	6	51	8
New Mexico	74	65	65	79	82.3	34	12	22	9	3	16	—
Dist. 3 total	**6,403**	**5,824**	**5,925**	**7,221**	**82.1**	**2,925**	**697**	**2,228**	**78**	**628**	**1,346**	**367**
Dist. 4 total	**434**	**411**	**417**	**527**	**79.1**	**221**	**75**	**146**	**11**	**31**	**104**	**12**
Dist. 5 total	**2,386**	**2,360**	**2,381**	**3,068**	**77.6**	**1,104**	**274**	**830**	**56**	**295**	**450**	**317**
January 23, 1987	**13,493**	**12,517**	**12,727**	**15,594**	**81.6**	**6,665**	**1,638**	**5,027**	**183**	**1,205**	**2,870**	**965**
January 16, 1987†	**13,750**	**12,603**	**12,817**	**15,594**	**82.2**	**7,101**	**1,923**	**5,178**	**170**	**1,186**	**2,829**	**994**
January 24, 1986	**13,973**	**12,404**	**12,575**	**15,674**	**80.2**	**6,429**	**2,028**	**4,401**	**202**	**1,192**	**2,886**	**1,024**

*Included in total motor gasoline. †Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API refinery report—February 27, 1987

District	Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Motor gasoline Total	Motor gasoline Leaded*	Motor gasoline Unleaded*	Jet fuel Naphtha	Jet fuel Kero	Fuel oils Distillate	Fuel oils Residual
	Refinery operations (Thousands of barrels daily)					Refinery output (Thousands of barrels daily)						
East coast	1,271	1,106	1,112	1,346	82.6	573	93	480	25	69	301	148
App. Dist. 1	108	99	100	108	92.6	36	10	26	—	—	29	8
Dist. 1 total	**1,379**	**1,205**	**1,212**	**1,454**	**83.4**	**609**	**103**	**506**	**25**	**69**	**330**	**156**
App. Dist. 2	54	54	54	66	81.8	37	9	28	—	—	13	3
Ind., Ill., Ky.	1,879	1,763	1,790	2,210	81.0	1,112	244	868	12	110	375	65
Minn., Wis., Dak.	299	281	283	322	87.9	123	34	89	1	7	75	7
Okla., Kan., Mo.	623	566	577	726	79.5	387	157	230	5	38	134	8
Dist. 2 total	**2,855**	**2,664**	**2,704**	**3,324**	**81.3**	**1,659**	**444**	**1,215**	**18**	**155**	**597**	**83**
Inland Texas	524	415	420	568	73.9	295	103	192	32	27	85	20
Texas Gulf coast	3,113	2,747	2,800	3,738	74.9	1,517	337	1,180	13	297	529	112
La. Gulf Coast	2,114	1,963	1,963	2,578	76.9	1,023	267	756	20	224	467	137
N. La. and Ark.	177	159	164	258	63.6	57	9	48	7	1	48	4
New Mexico	54	52	53	79	67.1	32	14	18	6	—	12	—
Dist. 3 total	**5,982**	**5,336**	**5,420**	**7,221**	**75.1**	**2,924**	**730**	**2,194**	**78**	**549**	**1,141**	**273**
Dist. 4 total	**434**	**410**	**413**	**527**	**78.4**	**215**	**85**	**130**	**18**	**21**	**111**	**10**
Dist. 5 total	**2,423**	**2,423**	**2,423**	**3,068**	**79.0**	**1,147**	**295**	**852**	**38**	**286**	**332**	**323**
February 27, 1987	**13,073**	**12,038**	**12,172**	**15,594**	**78.1**	**6,554**	**1,657**	**4,897**	**177**	**1,080**	**2,511**	**845**
February 20, 1987†	**13,188**	**12,199**	**12,424**	**15,594**	**79.7**	**6,406**	**1,768**	**4,638**	**197**	**1,061**	**2,557**	**852**
February 28, 1986	**13,470**	**12,065**	**12,221**	**15,674**	**78.0**	**6,592**	**1,993**	**4,599**	**205**	**1,171**	**2,594**	**799**

*Included in total motor gasoline. †Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API refinery report—March 27, 1987

District	Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Motor gasoline Total	Motor gasoline Leaded*	Motor gasoline Unleaded*	Jet fuel Naphtha	Jet fuel Kero	Fuel oils Distillate	Fuel oils Residual
	Refinery operations (Thousands of barrels daily)					Refinery output (Thousands of barrels daily)						
East coast	1,201	1,001	1,009	1,346	75.0	603	91	512	15	52	251	186
App. Dist. 1	108	100	101	108	93.5	41	11	30	—	3	27	5
Dist. 1 total	**1,309**	**1,101**	**1,110**	**1,454**	**76.3**	**644**	**102**	**542**	**15**	**55**	**278**	**191**
App. Dist. 2	61	61	61	66	92.4	42	11	31	—	2	15	2
Ind., Ill., Ky.	1,806	1,704	1,720	2,210	77.8	998	187	811	8	112	327	61
Minn., Wis., Dak.	299	289	289	322	89.8	145	48	97	—	22	63	3
Okla., Kan., Mo.	682	633	633	726	87.2	313	132	181	2	24	146	—
Dist. 2 total	**2,848**	**2,687**	**2,703**	**3,324**	**81.3**	**1,498**	**378**	**1,120**	**10**	**160**	**551**	**66**
Inland Texas	540	472	472	568	83.1	283	97	186	24	24	107	16
Texas Gulf coast	3,297	2,871	2,871	3,738	76.8	1,432	304	1,128	34	270	529	174
La. Gulf Coast	2,319	2,147	2,151	2,578	83.4	1,122	204	918	13	268	370	98
N. La. and Ark.	170	161	164	258	63.6	44	10	34	14	5	44	5
New Mexico	65	65	65	79	82.3	35	13	22	10	1	14	—
Dist. 3 total	**6,391**	**5,716**	**5,723**	**7,221**	**79.3**	**2,916**	**628**	**2,288**	**95**	**578**	**1,064**	**293**
Dist. 4 total	**306**	**294**	**295**	**527**	**56.0**	**222**	**98**	**124**	**4**	**24**	**86**	**8**
Dist. 5 total	**2,562**	**2,374**	**2,374**	**3,068**	**77.4**	**1,143**	**298**	**845**	**64**	**300**	**409**	**390**
March 27, 1987	**13,416**	**12,172**	**12,205**	**15,594**	**78.3**	**6,423**	**1,504**	**4,919**	**188**	**1,117**	**2,388**	**948**
March 20, 1987†	**13,417**	**12,151**	**12,269**	**15,594**	**78.7**	**6,562**	**1,589**	**4,973**	**185**	**1,078**	**2,427**	**877**
March 28, 1986	**13,275**	**11,739**	**11,963**	**15,674**	**76.3**	**6,059**	**1,937**	**4,122**	**202**	**1,078**	**2,861**	**813**

*Included in total motor gasoline. †Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API refinery report—April 24, 1987

	Refinery operations (Thousands of barrels daily)					Refinery output (Thousands of barrels daily)						
						Motor gasoline			Jet fuel		Fuel oils	
District	Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Total	Leaded*	Unleaded*	Naphtha	Kero	Distillate	Residual
East coast	1,308	1,168	1,169	1,356	86.2	637	115	522	34	50	240	127
App. Dist. 1	98	92	92	108	85.2	38	8	30	—	—	32	3
Dist. 1 total	**1,406**	**1,260**	**1,261**	**1,464**	**86.1**	**675**	**123**	**552**	**34**	**50**	**272**	**130**
App. Dist. 2	68	68	68	66	103.0	44	12	32	—	—	17	3
Ind., Ill., Ky.	2,07[illegible]	1,967	1,981	2,166	91.5	1,090	241	849	17	153	408	63
Minn., Wis., Dak.	29[illegible]	298	296	322	92.5	159	50	109	1	18	76	15
Okla., Kan., Mo.	708	673	673	749	89.9	377	91	286	7	29	168	4
Dist. 2 total	**3,152**	**3,006**	**3,020**	**3,303**	**91.4**	**1,670**	**394**	**1,276**	**25**	**200**	**669**	**85**
Inland Texas	497	466	466	568	82.4	298	129	169	33	28	107	15
Texas Gulf coast	2,957	2,767	2,778	3,632	76.5	1,617	367	1,250	29	247	553	161
La. Gulf Coast	2,112	2,018	2,018	2,578	78.3	1,268	308	960	27	223	399	96
N. La. and Ark.	157	152	152	258	58.9	57	9	48	8	3	48	8
New Mexico	67	66	67	79	84.8	42	15	27	10	2	16	—
Dist. 3 total	**5,790**	**5,471**	**5,483**	**7,115**	**77.1**	**3,282**	**828**	**2,454**	**107**	**503**	**1,123**	**280**
Dist. 4 total	**449**	**442**	**442**	**527**	**83.9**	**263**	**122**	**141**	**10**	**34**	**120**	**9**
Dist. 5 total	**2,689**	**2,611**	**2,611**	**3,212**	**81.3**	**1,195**	**328**	**867**	**66**	**302**	**378**	**375**
April 24, 1987	**13,486**	**12,790**	**12,817**	**15,621**	**82.0**	**7,085**	**1,795**	**5,290**	**242**	**1,089**	**2,562**	**879**
April 17, 1987†	**13,566**	**12,553**	**12,664**	**15,621**	**81.1**	**6,602**	**1,641**	**4,961**	**199**	**1,094**	**2,526**	**862**
April 25, 1986	**13,974**	**12,536**	**12,775**	**15,511**	**82.4**	**6,640**	**2,016**	**4,624**	**213**	**1,020**	**2,732**	**860**

*Included in total motor gasoline. †Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API refinery report—May 22, 1987

	Refinery operations (Thousands of barrels daily)					Refinery output (Thousands of barrels daily)						
						Motor gasoline			Jet fuel		Fuel oils	
District	Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Total	Leaded*	Unleaded*	Naphtha	Kero	Distillate	Residual
East coast	1,282	1,105	1,111	1,356	81.9	615	112	503	17	38	236	108
App. Dist. 1	111	102	110	108	101.9	34	8	26	—	—	38	1
Dist. 1 total	**1,393**	**1,207**	**1,221**	**1,464**	**83.4**	**649**	**120**	**529**	**17**	**38**	**274**	**109**
App. Dist. 2	62	62	62	66	93.9	37	8	29	—	—	15	3
Ind., Ill., Ky.	2,004	1,860	1,876	2,166	86.6	1,121	260	861	15	140	365	43
Minn., Wis., Dak.	234	222	222	322	68.9	113	40	73	1	11	62	9
Okla., Kan., Mo.	700	653	654	749	87.3	383	133	250	4	27	172	7
Dist. 2 total	**3,000**	**2,797**	**2,814**	**3,303**	**85.2**	**1,654**	**441**	**1,213**	**20**	**178**	**614**	**62**
Inland Texas	546	504	504	568	88.7	302	110	192	38	32	114	17
Texas Gulf coast	3,197	2,920	2,956	3,632	81.4	1,635	374	1,261	51	219	583	154
La. Gulf Coast	2,101	2,072	2,080	2,578	80.7	1,114	249	865	22	210	414	117
N. La. and Ark.	178	150	155	258	60.1	61	11	50	6	2	52	6
New Mexico	59	58	59	79	74.7	43	16	27	7	2	16	—
Dist. 3 total	**6,081**	**5,704**	**5,754**	**7,115**	**80.9**	**3,155**	**760**	**2,395**	**124**	**465**	**1,179**	**294**
Dist. 4 total	**423**	**417**	**417**	**527**	**79.1**	**226**	**74**	**152**	**17**	**27**	**107**	**7**
Dist. 5 total	**2,616**	**2,477**	**2,478**	**3,212**	**77.1**	**1,160**	**305**	**855**	**77**	**301**	**411**	**309**
May 22, 1987	**13,513**	**12,602**	**12,684**	**15,621**	**81.2**	**6,844**	**1,700**	**5,144**	**255**	**1,009**	**2,585**	**781**
May 15, 1987†	**13,403**	**12,337**	**12,480**	**15,621**	**79.9**	**6,845**	**1,692**	**5,153**	**221**	**1,016**	**2,478**	**794**
May 23, 1986	**14,734**	**13,344**	**13,492**	**15,511**	**87.0**	**7,036**	**2,369**	**4,667**	**148**	**1,066**	**2,890**	**953**

*Included in total motor gasoline. †Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API refinery report—June 26, 1987

	Refinery operations (Thousands of barrels daily)					Refinery output (Thousands of barrels daily)						
						Motor gasoline			Jet fuel		Fuel oils	
District	Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Total	Leaded*	Unleaded*	Naphtha	Kero	Distillate	Residual
East coast	1,461	1,287	1,287	1,356	94.9	726	144	582	30	60	322	141
App. Dist. 1	110	101	101	108	93.5	42	18	24	—	—	37	2
Dist. 1 total	**1,571**	**1,388**	**1,388**	**1,464**	**94.8**	**768**	**162**	**606**	**30**	**60**	**359**	**143**
App. Dist. 2	62	62	62	66	93.9	40	10	30	—	3	15	3
Ind., Ill., Ky.	2,055	1,914	1,929	2,166	89.1	1,114	281	833	9	109	419	51
Minn., Wis., Dak.	318	307	307	322	95.3	168	64	104	1	22	70	11
Okla., Kan., Mo.	716	669	672	749	89.7	384	115	269	1	40	182	9
Dist. 2 total	**3,151**	**2,952**	**2,970**	**3,303**	**89.9**	**1,706**	**470**	**1,236**	**11**	**174**	**686**	**74**
Inland Texas	577	481	481	568	84.7	315	104	211	31	26	122	19
Texas Gulf coast	3,398	3,015	3,059	3,632	84.2	1,661	384	1,277	36	229	606	162
La. Gulf Coast	2,592	2,321	2,350	2,578	91.2	1,235	250	985	14	217	466	108
N. La. and Ark.	174	164	165	258	64.0	53	13	40	6	3	53	6
New Mexico	99	68	68	79	86.1	42	16	26	7	1	16	—
Dist. 3 total	**6,840**	**6,049**	**6,123**	**7,115**	**86.1**	**3,306**	**767**	**2,539**	**94**	**476**	**1,263**	**295**
Dist. 4 total	**469**	**455**	**457**	**527**	**86.7**	**270**	**110**	**160**	**11**	**25**	**117**	**12**
Dist. 5 total	**2,663**	**2,548**	**2,548**	**3,212**	**79.3**	**1,227**	**371**	**856**	**37**	**269**	**445**	**347**
June 26, 1987	**14,694**	**13,392**	**13,486**	**15,621**	**86.3**	**7,277**	**1,880**	**5,397**	**183**	**1,004**	**2,870**	**871**
June 19, 1987†	**14,287**	**13,098**	**13,262**	**15,621**	**84.9**	**6,913**	**1,736**	**5,177**	**208**	**1,088**	**2,669**	**880**
June 27, 1986	**14,651**	**13,440**	**13,595**	**15,511**	**87.6**	**7,073**	**2,090**	**4,983**	**189**	**1,123**	**2,884**	**921**

*Included in total motor gasoline. †Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API refinery report—July 24, 1987

District	Refinery operations (Thousands of barrels daily) Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Refinery output (Thousands of barrels daily) Motor gasoline Total	Motor gasoline Leaded*	Motor gasoline Unleaded*	Jet fuel Naphtha	Jet fuel Kero	Fuel oils Distillate	Fuel oils Residual
East coast	1,404	1,263	1,268	1,400	90.6	682	133	549	43	79	321	139
App. Dist. 1...........	113	105	105	105	100.0	43	12	31	—	—	40	3
Dist. 1 total........	**1,517**	**1,368**	**1,373**	**1,505**	**91.2**	**725**	**145**	**580**	**43**	**79**	**361**	**142**
App. Dist. 2...........	65	65	65	66	98.5	39	11	28	—	3	14	2
Ind., Ill., Ky.	2,089	1,968	1,981	2,154	92.0	1,157	269	888	13	106	387	41
Minn., Wis., Dak. ...	318	306	307	317	96.8	178	49	129	2	19	65	14
Okla., Kan., Mo......	704	663	672	716	93.9	378	157	221	6	35	187	7
Dist. 2 total........	**3,176**	**3,002**	**3,025**	**3,253**	**93.0**	**1,752**	**486**	**1,266**	**21**	**163**	**653**	**64**
Inland Texas	594	498	508	568	[illegible]	318	100	218	30	34	128	16
Texas Gulf coast	3,474	3,016	3,099	3,569	86.8	1,646	300	1,346	32	258	610	185
La. Gulf Coast........	2,582	2,237	2,281	2,648	86.1	1,122	194	928	32	247	436	147
N. La. and Ark.	184	173	178	257	69.3	59	15	44	4	5	50	7
New Mexico...........	97	69	69	81	85.2	40	12	28	9	2	14	—
Dist. 3 total........	**6,931**	**5,993**	**6,135**	**7,123**	**86.1**	**3,185**	**621**	**2,564**	**107**	**546**	**1,240**	**355**
Dist. 4 total........	**508**	**486**	**489**	**552**	**88.6**	**266**	**111**	**155**	**9**	**24**	**132**	**10**
Dist. 5 total........	**2,557**	**2,537**	**2,548**	**3,259**	**78.2**	**1,205**	**394**	**811**	**44**	**343**	**402**	**362**
July 24, 1987	**14,689**	**13,386**	**13,570**	**15,692**	**86.5**	**7,133**	**1,757**	**5,376**	**224**	**1,155**	**2,788**	**933**
July 17, 1987†	**14,664**	**13,419**	**13,610**	**15,692**	**86.7**	**7,175**	**1,835**	**5,340**	**207**	**1,201**	**2,587**	**940**
July 25, 1986	**13,989**	**12,953**	**13,011**	**15,602**	**83.4**	**7,020**	**2,081**	**4,939**	**219**	**1,112**	**2,788**	**861**

*Included in total motor gasoline. †Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API refinery report—August 28, 1987

District	Refinery operations (Thousands of barrels daily) Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Refinery output (Thousands of barrels daily) Motor gasoline Total	Motor gasoline Leaded*	Motor gasoline Unleaded*	Jet fuel Naphtha	Jet fuel Kero	Fuel oils Distillate	Fuel oils Residual
East coast	1,400	1,278	1,278	1,400	91.3	694	147	547	20	93	252	123
App. Dist. 1...........	98	93	94	105	89.5	40	18	22	—	—	29	2
Dist. 1 total........	**1,498**	**1,371**	**1,372**	**1,505**	**91.2**	**734**	**165**	**569**	**20**	**93**	**281**	**125**
App. Dist. 2...........	64	64	64	66	97.0	40	10	30	—	2	17	2
Ind., Ill., Ky.	2,128	1,999	1,999	2,154	92.8	1,131	252	879	9	129	380	43
Minn., Wis., Dak. ...	326	314	315	317	99.4	173	41	132	2	17	73	7
Okla., Kan., Mo......	707	659	666	716	93.0	395	129	266	7	33	161	4
Dist. 2 total........	**3,225**	**3,036**	**3,044**	**3,253**	**93.6**	**1,739**	**432**	**1,307**	**18**	**181**	**631**	**56**
Inland Texas	574	492	492	568	86.6	263	105	158	31	35	122	14
Texas Gulf coast	3,244	2,860	2,900	3,569	81.3	1,517	314	1,203	62	305	585	233
La. Gulf Coast........	2,511	2,282	2,320	2,648	87.6	1,240	233	1,007	28	252	470	98
N. La. and Ark.	175	160	164	257	63.8	66	8	58	3	11	43	8
New Mexico...........	92	70	71	81	87.7	41	15	26	9	2	14	—
Dist. 3 total........	**6,596**	**5,864**	**5,947**	**7,123**	**83.5**	**3,127**	**675**	**2,452**	**133**	**605**	**1,234**	**353**
Dist. 4 total........	**509**	**488**	**492**	**552**	**89.1**	**252**	**116**	**136**	**14**	**20**	**119**	**18**
Dist. 5 total........	**2,614**	**2,535**	**2,537**	**3,259**	**77.8**	**1,219**	**382**	**837**	**49**	**333**	**400**	**381**
August 28, 1987	**14,442**	**13,294**	**13,392**	**15,692**	**85.3**	**7,071**	**1,770**	**5,301**	**234**	**1,232**	**2,665**	**933**
August 21, 1987†....	**14,653**	**13,430**	**13,545**	**15,692**	**86.3**	**6,941**	**1,615**	**5,326**	**193**	**1,153**	**2,735**	**951**
August 29, 1986.....	**14,710**	**13,316**	**13,471**	**15,602**	**86.3**	**7,171**	**2,304**	**4,867**	**156**	**1,066**	**2,964**	**967**

*Included in total motor gasoline. †Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API refinery report—September 25, 1987

District	Refinery operations (Thousands of barrels daily) Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Refinery output (Thousands of barrels daily) Motor gasoline Total	Motor gasoline Leaded*	Motor gasoline Unleaded*	Jet fuel Naphtha	Jet fuel Kero	Fuel oils Distillate	Fuel oils Residual
East coast	1,291	1,150	1,151	1,400	82.2	635	103	532	22	65	283	127
App. Dist. 1...........	116	106	106	105	101.0	41	7	34	—	—	34	2
Dist. 1 total........	**1,407**	**1,256**	**1,257**	**1,505**	**83.5**	**676**	**110**	**566**	**22**	**65**	**317**	**129**
App. Dist. 2...........	63	63	63	66	95.5	37	10	27	—	—	15	2
Ind., Ill., Ky.	2,113	1,995	1,995	2,154	92.6	1,169	231	938	7	113	413	42
Minn., Wis., Dak. ...	324	311	311	317	98.1	156	34	122	—	14	73	7
Okla., Kan., Mo......	669	623	629	716	87.8	325	136	189	6	44	164	4
Dist. 2 total........	**3,169**	**2,992**	**2,998**	**3,253**	**92.2**	**1,687**	**411**	**1,276**	**13**	**171**	**665**	**55**
Inland Texas	551	471	479	568	84.3	277	74	203	25	29	122	15
Texas Gulf coast	3,256	2,968	2,987	3,569	83.7	1,464	325	1,139	44	333	609	155
La. Gulf Coast........	2,536	2,267	2,317	2,648	87.5	1,243	229	1,014	27	287	452	132
N. La. and Ark.	163	147	153	257	59.5	39	2	37	5	11	35	8
New Mexico...........	68	68	69	81	85.2	41	15	26	9	1	16	—
Dist. 3 total........	**6,594**	**5,921**	**6,005**	**7,123**	**84.3**	**3,064**	**645**	**2,419**	**110**	**661**	**1,234**	**310**
Dist. 4 total........	**482**	**446**	**448**	**552**	**81.2**	**222**	**90**	**132**	**9**	**26**	**114**	**11**
Dist. 5 total........	**2,685**	**2,623**	**2,646**	**3,259**	**81.2**	**1,141**	**310**	**831**	**42**	**308**	**415**	**380**
September 25, 1987	**14,337**	**13,238**	**13,354**	**15,692**	**85.1**	**6,790**	**1,566**	**5,224**	**196**	**1,231**	**2,745**	**885**
September 18, 1987†	**14,286**	**13,171**	**13,260**	**15,692**	**84.5**	**6,917**	**1,666**	**5,251**	**216**	**1,269**	**2,620**	**865**
September 26, 1986	**14,240**	**12,946**	**13,056**	**15,602**	**83.7**	**6,827**	**2,002**	**4,825**	**193**	**1,103**	**2,828**	**878**

*Included in total motor gasoline. †Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API refinery report—October 23, 1987

District	Refinery operations (Thousands of barrels daily)					Refinery output (Thousands of barrels daily)						
	Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Motor gasoline Total	Motor gasoline Leaded*	Motor gasoline Unleaded*	Jet fuel Naphtha	Jet fuel Kero	Fuel oils Distillate	Fuel oils Residual
East coast	1,297	1,125	1,129	1,400	80.6	592	95	497	13	62	282	111
App. Dist. 1	99	92	92	105	87.6	25	4	21	—	—	31	3
Dist. 1 total	**1,396**	**1,217**	**1,221**	**1,505**	**81.1**	**617**	**99**	**518**	**13**	**62**	**313**	**114**
App. Dist. 2	45	45	45	66	68.2	20	5	15	—	—	10	2
Ind., Ill., Ky.	2,002	1,909	1,924	2,154	89.3	1,106	232	874	6	129	352	54
Minn., Wis., Dak.	328	315	315	317	99.4	169	33	136	1	14	93	6
Okla., Kan., Mo.	633	594	596	720	83.1	350	174	176	7	28	154	2
Dist. 2 total	**3,008**	**2,863**	**2,882**	**3,257**	**88.5**	**1,645**	**444**	**1,201**	**14**	**171**	**609**	**64**
Inland Texas	565	483	488	569	85.8	273	71	202	21	36	126	15
Texas Gulf coast	3,332	2,936	2,959	3,569	82.9	1,648	335	1,313	27	266	600	194
La. Gulf Coast	2,472	2,279	2,349	2,648	88.7	1,191	252	939	30	289	513	108
N. La. and Ark.	143	129	132	257	51.4	35	11	24	9	7	30	11
New Mexico	76	68	70	81	86.4	44	17	27	8	1	17	—
Dist. 3 total	**6,588**	**5,895**	**5,998**	**7,124**	**84.2**	**3,191**	**686**	**2,505**	**95**	**599**	**1,286**	**328**
Dist. 4 total	**479**	**454**	**456**	**552**	**82.6**	**232**	**104**	**128**	**17**	**30**	**116**	**6**
Dist. 5 total	**2,470**	**2,257**	**2,257**	**3,259**	**69.3**	**1,123**	**275**	**848**	**54**	**304**	**448**	**361**
October 23, 1987	**13,941**	**12,686**	**12,814**	**15,697**	**81.6**	**6,808**	**1,608**	**5,200**	**193**	**1,166**	**2,772**	**893**
October 16, 1987†	**14,011**	**12,861**	**12,985**	**15,697**	**82.7**	**6,657**	**1,503**	**5,154**	**232**	**1,169**	**2,812**	**878**
October 24, 1986	**13,978**	**12,731**	**12,910**	**15,594**	**82.8**	**6,485**	**1,910**	**4,575**	**211**	**1,190**	**2,691**	**813**

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*Included in total motor gasoline. †Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API refinery report—November 27, 1987

District	Refinery operations (Thousands of barrels daily)					Refinery output (Thousands of barrels daily)						
	Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Motor gasoline Total	Motor gasoline Leaded*	Motor gasoline Unleaded*	Jet fuel Naphtha	Jet fuel Kero	Fuel oils Distillate	Fuel oils Residual
East coast	1,310	1,059	1,063	1,400	75.9	656	137	519	13	76	318	120
App. Dist. 1	114	103	104	105	99.0	36	7	29	—	—	35	2
Dist. 1 total	**1,424**	**1,162**	**1,167**	**1,505**	**77.5**	**692**	**144**	**548**	**13**	**76**	**353**	**122**
App. Dist. 2	51	51	51	66	77.3	35	—	35	—	—	15	3
Ind., Ill., Ky.	1,983	1,840	1,850	2,154	85.9	1,098	172	926	24	117	410	64
Minn., Wis., Dak.	334	316	316	317	99.7	154	36	118	—	20	87	8
Okla., Kan., Mo.	722	653	659	720	91.5	402	144	258	5	37	181	5
Dist. 2 total	**3,090**	**2,860**	**2,876**	**3,257**	**88.3**	**1,689**	**352**	**1,337**	**29**	**174**	**693**	**80**
Inland Texas	555	481	484	569	85.1	277	90	187	29	26	128	18
Texas Gulf coast	3,401	3,060	3,092	3,569	86.6	1,490	312	1,178	4	264	697	221
La. Gulf Coast	2,480	2,376	2,388	2,648	90.2	1,226	257	969	27	337	524	56
N. La. and Ark.	196	169	182	257	70.8	55	8	47	10	1	52	8
New Mexico	79	71	69	81	85.2	39	16	23	8	2	20	—
Dist. 3 total	**6,711**	**6,157**	**6,215**	**7,124**	**87.2**	**3,087**	**683**	**2,404**	**78**	**630**	**1,421**	**303**
Dist. 4 total	**448**	**418**	**425**	**552**	**77.0**	**230**	**100**	**130**	**8**	**19**	**114**	**8**
Dist. 5 total	**2,670**	**2,511**	**2,511**	**3,259**	**77.0**	**1,162**	**285**	**877**	**68**	**311**	**409**	**390**
November 27, 1987	**14,343**	**13,108**	**13,194**	**15,697**	**84.1**	**6,860**	**1,564**	**5,296**	**196**	**1,210**	**2,990**	**903**
November 20, 1987†	**14,180**	**12,963**	**13,092**	**15,697**	**83.4**	**6,983**	**1,661**	**5,322**	**224**	**1,119**	**3,035**	**1,042**
November 28, 1986	**14,456**	**12,968**	**13,127**	**15,594**	**84.2**	**6,958**	**1,981**	**4,977**	**220**	**1,145**	**3,025**	**1,027**

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*Included in total motor gasoline. †Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API refinery report—December 18, 1987

District	Refinery operations (Thousands of barrels daily)					Refinery output (Thousands of barrels daily)						
	Total refinery input	Crude runs	Input to crude stills	Operable capacity	% operated	Motor gasoline Total	Motor gasoline Leaded*	Motor gasoline Unleaded*	Jet fuel Naphtha	Jet fuel Kero	Fuel oils Distillate	Fuel oils Residual
East coast	1,468	1,261	1,261	1,400	90.1	688	73	615	24	80	416	170
App. Dist. 1	103	93	94	105	89.5	39	13	26	—	—	30	4
Dist. 1 total	**1,571**	**1,354**	**1,355**	**1,505**	**90.0**	**727**	**86**	**641**	**24**	**80**	**446**	**174**
Ind., Ill., Ky.	2,201	1,913	1,950	2,220	87.8	1,185	214	971	16	137	448	78
Minn., Wis., Dak.	295	281	281	317	88.6	154	35	119	—	7	70	8
Okla., Kan., Mo.	683	625	626	720	86.9	401	129	272	6	46	195	7
Dist. 2 total	**3,179**	**2,819**	**2,857**	**3,257**	**87.7**	**1,740**	**378**	**1,362**	**22**	**190**	**713**	**93**
Inland Texas	503	455	455	569	80.0	267	67	200	25	31	104	15
Texas Gulf coast	3,516	3,132	3,169	3,569	88.8	1,594	342	1,252	36	311	757	198
La. Gulf Coast	2,305	2,216	2,243	2,648	84.7	1,236	278	958	43	261	617	141
N. La. and Ark.	195	179	182	257	70.8	56	10	46	8	6	59	11
New Mexico	94	72	85	81	104.9	44	16	28	9	1	18	—
Dist. 3 total	**6,613**	**6,054**	**6,134**	**7,124**	**86.1**	**3,197**	**713**	**2,484**	**121**	**610**	**1,555**	**365**
Dist. 4 total	**437**	**421**	**425**	**552**	**77.0**	**234**	**96**	**138**	**14**	**21**	**129**	**11**
Dist. 5 total	**2,580**	**2,481**	**2,493**	**3,259**	**76.5**	**1,190**	**316**	**874**	**62**	**320**	**429**	**415**
December 18, 1987	**14,380**	**13,129**	**13,264**	**15,697**	**84.5**	**7,088**	**1,589**	**5,499**	**243**	**1,221**	**3,272**	**1,058**
December 11, 1987†	**14,253**	**12,895**	**12,992**	**15,697**	**82.8**	**6,706**	**1,414**	**5,292**	**195**	**1,266**	**3,144**	**864**
December 19, 1986	**13,986**	**12,885**	**13,043**	**15,594**	**83.6**	**7,085**	**2,069**	**5,016**	**191**	**1,227**	**3,095**	**1,025**

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*Included in total motor gasoline. †Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	14,019	70,446	19,065	46,042	5,339	1,217	11,548	67,734	21,497	11,141
PAD II	74,659	69,702	23,039	39,124	7,539	900	9,258	35,041	2,927	12,694
PAD III	150,876	70,309	16,782	36,698	16,829	2,249	15,286	28,783	9,905	45,872
PAD IV	12,520	7,265	2,604	2,575	2,086	541	941	3,303	364	2,050
PAD I-IV	**252,074**	**217,722**	**61,490**	**124,439**	**31,793**	**4,907**	**37,033**	**134,861**	**34,693**	**71,757**
PAD V	75,170*	29,321	8,325	13,567	7,429	2,126	5,585	11,244	7,561	22,121
January 23, 1987	**327,244***	**247,043**	**69,815**	**138,006**	**39,222**	**7,033**	**42,618**	**146,105**	**42,254**	**93,878**
January 16, 1987§	**328,246**	**246,213**	**70,695**	**136,664**	**38,854**	**7,306**	**43,731**	**149,764**	**42,942**	**93,858**
January 24, 1986	**325,060**	**230,787**	**77,214**	**114,243**	**39,330**	**6,676**	**34,585**	**143,072**	**48,119**	**103,496**

*Includes 22,689 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	16,113	68,669	18,035	45,081	5,553	1,282	10,577	52,754	17,665	11,371
PAD II	73,173	71,191	23,207	38,354	9,630	926	9,103	33,496	2,641	13,532
PAD III	153,079	72,497	18,032	37,774	16,691	1,904	15,067	27,062	10,244	49,989
PAD IV	12,296	8,530	2,908	3,033	2,589	487	673	3,234	311	2,596
PAD I-IV	**254,661**	**220,887**	**62,182**	**124,242**	**34,463**	**4,599**	**35,420**	**116,546**	**30,861**	**77,488**
PAD V	74,722*	32,031	8,217	15,547	8,267	2,255	5,890	10,555	7,175	23,387
February 27, 1987	**329,383***	**252,918**	**70,399**	**139,789**	**42,730**	**6,854**	**41,310**	**127,101**	**38,036**	**100,875**
February 20, 1987§	**328,680**	**252,947**	**70,083**	**139,196**	**43,668**	**7,067**	**40,842**	**131,500**	**38,422**	**97,282**
February 28, 1986	**333,125**	**244,592**	**80,849**	**125,806**	**37,937**	**6,992**	**36,139**	**114,581**	**41,859**	**101,324**

*Includes 21,692 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	15,486	67,600	16,708	46,081	4,811	1,182	10,771	41,037	16,377	10,386
PAD II	74,109	66,707	21,373	36,114	9,220	862	9,515	29,904	3,510	15,071
PAD III	151,139	72,337	16,544	37,268	18,525	2,231	14,780	21,826	9,800	53,677
PAD IV	13,411	8,714	3,095	2,818	2,801	471	683	3,025	319	2,227
PAD I-IV	**254,145**	**215,358**	**57,720**	**122,281**	**35,357**	**4,746**	**35,749**	**95,792**	**30,006**	**81,361**
PAD V	75,388*	30,443	8,198	14,679	7,566	2,173	6,154	10,516	8,218	23,258
March 27, 1987	**329,533***	**245,801**	**65,918**	**136,960**	**42,923**	**6,919**	**41,903**	**106,308**	**38,224**	**104,619**
March 20, 1987§	**333,764**	**246,063**	**65,770**	**136,584**	**43,709**	**7,051**	**40,903**	**108,827**	**35,636**	**105,123**
March 28, 1986	**342,620**	**225,468**	**74,507**	**116,053**	**34,908**	**6,177**	**38,898**	**95,143**	**39,387**	**100,755**

*Includes 23,766 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	17,163	69,573	16,409	48,490	4,674	1,142	10,533	37,142	16,637	11,954
PAD II	67,339	68,073	20,807	37,913	9,353	833	9,941	30,768	3,039	17,225
PAD III	147,054	70,603	14,463	37,471	18,669	2,339	13,003	22,675	10,303	50,966
PAD IV	13,297	8,256	3,018	2,628	2,610	457	779	2,871	335	2,385
PAD I-IV	**244,853**	**216,505**	**54,697**	**126,502**	**35,306**	**4,771**	**34,256**	**93,456**	**30,314**	**82,530**
PAD V	76,870*	29,859	7,554	14,353	7,952	2,208	6,594	10,492	8,398	24,681
April 24, 1987	**321,723***	**246,364**	**62,251**	**140,855**	**43,258**	**6,979**	**40,850**	**103,948**	**38,712**	**107,211**
April 17, 1987§	**323,344**	**247,183**	**63,512**	**140,393**	**43,278**	**6,772**	**41,485**	**104,765**	**39,178**	**107,163**
April 25, 1986	**332,576**	**208,789**	**65,695**	**109,574**	**33,520**	**6,233**	**41,328**	**97,265**	**37,595**	**106,416**

*Includes 22,917 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	17,761	64,703	15,003	44,724	4,976	1,358	10,358	32,086	18,336	13,120
PAD II	70,122	63,927	18,851	36,696	8,380	800	8,984	27,726	2,873	16,811
PAD III	148,355	66,750	14,265	36,855	15,630	2,256	12,539	22,877	10,386	46,658
PAD IV	13,033	7,847	2,854	2,775	2,218	464	806	2,581	420	2,236
PAD I-IV	**249,271**	**203,227**	**50,973**	**121,050**	**31,204**	**4,878**	**32,687**	**85,270**	**32,015**	**78,825**
PAD V	75,637*	30,736	7,160	15,810	7,766	2,292	6,749	10,760	7,366	24,203
May 22, 1987	**324,908***	**233,963**	**58,133**	**136,860**	**38,970**	**7,170**	**39,436**	**96,030**	**39,381**	**103,028**
May 15, 1987§	**326,062**	**235,874**	**58,206**	**138,078**	**39,590**	**6,564**	**40,102**	**96,002**	**37,691**	**103,643**
May 23, 1986	**327,946**	**212,461**	**67,234**	**111,141**	**34,086**	**5,484**	**38,124**	**93,201**	**35,270**	**114,508**

*Includes 26,081 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	18,003	65,546	14,605	46,472	4,469	1,644	10,119	35,577	17,528	13,872
PAD II	65,865	59,536	18,129	33,780	7,627	933	8,524	28,632	3,106	14,426
PAD III	154,422	66,091	12,924	35,133	18,034	2,034	12,580	25,573	10,142	49,535
PAD IV	11,797	6,535	2,367	2,327	1,841	390	780	2,505	323	2,067
PAD I-IV	**250,087**	**197,706**	**48,025**	**117,712**	**31,971**	**5,001**	**32,003**	**92,287**	**31,099**	**79,900**
PAD V	75,490*	32,728	7,833	17,180	7,715	2,170	6,047	10,240	6,802	23,031
June 26, 1987	**325,577***	**230,436**	**55,858**	**134,892**	**39,686**	**7,171**	**38,050**	**102,527**	**37,901**	**102,931**
June 19, 1987§	**324,079**	**230,407**	**56,384**	**134,906**	**39,117**	**6,431**	**39,769**	**101,886**	**38,632**	**103,386**
June 27, 1986	**323,877**	**228,006**	**72,589**	**120,074**	**35,343**	**5,796**	**39,315**	**104,547**	**37,968**	**112,092**

*Includes 21,709 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	14,667	67,473	14,908	46,844	5,721	1,749	10,617	40,476	18,771	14,234
PAD II	66,465	58,059	16,901	33,819	7,339	1,047	9,312	30,872	2,717	14,108
PAD III	151,855	63,622	13,634	34,316	15,672	2,599	14,274	28,352	13,251	48,820
PAD IV	11,434	5,690	2,115	2,285	1,290	376	697	2,660	334	2,070
PAD I-IV	**244,421**	**194,844**	**47,558**	**117,264**	**30,022**	**5,771**	**34,900**	**102,360**	**35,073**	**79,232**
PAD V	77,444*	31,914	7,616	16,167	8,131	2,080	6,271	9,915	7,871	23,339
July 24, 1987	**321,865***	**226,758**	**55,174**	**133,431**	**38,153**	**7,851**	**41,171**	**112,275**	**42,944**	**102,571**
July 17, 1987§	**317,449**	**229,905**	**55,775**	**135,771**	**38,359**	**6,990**	**39,347**	**109,246**	**41,397**	**104,500**
July 25, 1986	**326,252**	**222,060**	**70,643**	**116,090**	**35,327**	**6,301**	**41,916**	**109,776**	**40,235**	**107,761**

*Includes 26,209 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	17,689	67,529	14,140	47,739	5,650	1,057	9,901	48,029	19,157	13,965
PAD II	67,828	60,801	17,422	35,250	8,129	1,063	8,708	31,665	2,958	13,668
PAD III	164,592	61,875	12,733	33,860	15,282	2,526	17,137	31,524	12,141	51,647
PAD IV	11,463	5,330	1,941	2,179	1,210	349	687	2,471	466	1,984
PAD I-IV	**261,572**	**195,535**	**46,236**	**119,028**	**30,271**	**4,995**	**36,433**	**113,689**	**34,722**	**81,264**
PAD V	69,854*	31,001	7,133	16,199	7,669	1,802	4,896	9,849	8,715	22,782
August 28, 1987	**331,426***	**226,536**	**53,369**	**135,227**	**37,940**	**6,797**	**41,329**	**123,538**	**43,437**	**104,046**
August 21, 1987§	**330,466**	**227,674**	**52,904**	**135,166**	**39,604**	**6,795**	**41,260**	**121,324**	**42,096**	**104,367**
August 29, 1986	**333,203**	**216,322**	**68,894**	**112,552**	**34,876**	**6,197**	**42,631**	**130,128**	**41,244**	**100,664**

*Includes 21,118 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	16,395	64,799	13,758	45,420	5,621	1,292	10,989	51,604	20,531	14,255
PAD II	66,206	60,810	17,778	35,299	7,733	989	9,155	32,997	2,926	13,942
PAD III	164,542	66,808	13,893	36,003	16,912	2,588	16,233	30,732	11,844	47,805
PAD IV	11,881	5,874	2,310	2,210	1,354	339	790	2,703	495	2,101
PAD I-IV	**259,024**	**198,291**	**47,739**	**118,932**	**31,620**	**5,208**	**37,167**	**118,036**	**35,796**	**78,103**
PAD V	77,605*	30,448	7,475	15,723	7,250	1,625	5,969	10,843	8,534	24,127
September 25, 1987	**336,629***	**228,739**	**55,214**	**134,655**	**38,870**	**6,833**	**43,136**	**128,879**	**44,330**	**102,230**
September 18, 1987§	**336,217**	**228,276**	**53,687**	**135,144**	**39,445**	**7,171**	**42,374**	**127,597**	**44,116**	**102,813**
September 26, 1986	**335,263**	**234,272**	**69,369**	**126,624**	**38,279**	**6,110**	**43,669**	**147,766**	**43,733**	**98,670**

*Includes 22,879 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	15,162	62,635	12,779	45,209	4,647	1,198	10,186	52,821	21,579	12,781
PAD II	69,893	58,929	17,101	33,924	7,904	967	9,115	28,293	2,767	15,928
PAD III	166,859	66,371	13,111	37,211	16,049	2,514	18,127	30,455	12,528	45,936
PAD IV	12,312	6,099	2,061	2,346	1,692	359	758	2,432	404	2,451
PAD I-IV	**264,226**	**194,034**	**45,052**	**118,690**	**30,292**	**5,038**	**38,186**	**114,001**	**37,278**	**77,096**
PAD V	73,200*	29,162	7,250	14,390	7,522	1,709	6,777	11,061	8,503	24,951
October 23, 1987	**337,426***	**223,196**	**52,302**	**133,080**	**37,814**	**6,747**	**44,963**	**125,082**	**45,781**	**102,047**
October 16, 1987§	**333,606**	**223,173**	**52,669**	**130,851**	**39,653**	**6,847**	**42,170**	**126,116**	**45,320**	**100,984**
October 24, 1986	**339,493**	**226,338**	**64,950**	**123,442**	**37,946**	**6,938**	**43,195**	**151,038**	**46,826**	**101,662**

*Includes 21,270 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	16,194	63,312	12,825	45,818	4,669	1,189	10,652	52,472	20,563	12,444
PAD II	72,276	61,230	18,798	35,193	7,239	962	8,217	31,116	2,947	16,635
PAD III	172,544	64,679	12,882	35,864	15,933	2,494	16,175	28,186	13,079	46,835
PAD IV	12,929	6,010	2,047	2,547	1,416	316	744	2,509	505	2,479
PAD I-IV	**273,943**	**195,231**	**46,552**	**119,422**	**29,257**	**4,961**	**35,788**	**114,283**	**37,094**	**78,393**
PAD V	81,458*	29,054	6,795	14,716	7,543	1,629	7,339	10,365	10,382	24,452
November 27, 1987	**355,401***	**224,285**	**53,347**	**134,138**	**36,800**	**6,590**	**43,127**	**124,648**	**47,476**	**102,845**
November 20, 1987§	**358,038**	**219,133**	**51,589**	**130,049**	**37,495**	**6,703**	**43,495**	**125,304**	**46,008**	**100,456**
November 28, 1986	**346,364**	**225,438**	**64,221**	**123,297**	**37,920**	**6,729**	**41,355**	**149,147**	**46,460**	**101,533**

*Includes 24,421 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API crude and product stocks

(Thousands of barrels)

		Motor gasoline				Jet fuels		Fuel oils		
	Crude oil	Total	Leaded†	Unleaded†	Blending Comp.†	Naphtha	Kerosine	Distillate	Residual	Unfinished oils
PAD I	16,687	64,292	13,220	46,060	5,012	1,235	10,739	51,522	22,475	11,569
PAD II	72,997	62,149	18,963	35,323	7,863	1,047	8,826	34,008	3,392	14,951
PAD III	167,047	66,348	13,303	37,695	15,350	2,393	16,962	29,662	13,395	44,671
PAD IV	12,800	6,278	2,162	2,512	1,604	396	815	2,648	395	2,289
PAD I-IV	**269,531**	**199,067**	**47,648**	**121,590**	**29,829**	**5,071**	**37,342**	**117,840**	**39,657**	**73,480**
PAD V	86,026*	28,489	7,260	13,282	7,947	1,867	6,689	10,556	8,937	22,482
December 18, 1987	**355,557***	**227,556**	**54,908**	**134,872**	**37,776**	**6,938**	**44,031**	**128,396**	**48,594**	**95,962**
December 11, 1987§	**360,713**	**224,728**	**53,436**	**134,036**	**37,256**	**6,547**	**43,671**	**129,558**	**48,432**	**97,479**
December 19, 1986	**340,944**	**227,664**	**65,458**	**125,468**	**36,73[illegible]**	**7,068**	**41,734**	**152,270**	**44,833**	**97,087**

*Includes 23,671 bbl. of Alaskan crude in transit by water. †Included in total motor gasoline. §Revised.

Source: American Petroleum Institute

Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	1–23 1987	1–16* 1987	1–23 1987	1–16* 1987	1–23 1987	1–16* 1987	1–24 1986
Total motor gasoline	408	111	29	8	437	119	133
Leaded gasoline†	227	5	12	—	239	5	1
Unleaded gasoline†	181	106	17	8	198	114	132
Mo. gas. blending comp.	60	48	10	12	70	60	—
Distillate§	357	234	13	8	370	242	371
Residual	913	604	41	27	954	631	400
Jet fuel-naphtha	6	5	—	—	6	5	34
Jet fuel-kerosine	25	44	5	7	30	51	36
LPG	340	269	12	6	352	275	207
Unfinished oils	200	144	—	—	200	144	149
Other	249	179	—	—	249	179	265
Total products	**2,558**	**1,638**	**110**	**68**	**2,668**	**1,706**	**1,595**
Canadian crude	575	637	27	15	602	652	369
Other foreign	3,668	3,129	121	178	3,789	3,307	2,966
Total crude	**4,243**	**3,766**	**148**	**193**	**4,391**	**3,959**	**3,336**
Total imports	**6,801**	**5,404**	**258**	**261**	**7,059**	**5,665**	**4,930**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	2–27 1987	2–20* 1987	2–27 1987	2–20* 1987	2–27 1987	2–20* 1987	2–28 1986
Total motor gasoline	253	103	26	6	279	109	377
Leaded gasoline†	32	—	9	—	41	—	68
Unleaded gasoline†	221	103	17	6	238	109	309
Mo. gas. blending comp.	13	47	4	16	17	63	62
Distillate§	217	365	10	12	227	377	38
Residual	715	452	10	12	725	464	661
Jet fuel-naphtha	26	10	—	—	26	10	3
Jet fuel-kerosine	57	3	—	4	57	7	54
LPG	222	305	22	22	244	327	263
Unfinished oils	211	204	7	7	218	211	189
Other	472	120	102	36	574	156	241
Total products	**2,186**	**1,609**	**181**	**115**	**2,367**	**1,724**	**1,888**
Canadian crude	526	609	8	7	534	616	632
Other foreign	3,433	3,454	8	154	3,441	3,608	2,412
Total crude	**3,959**	**4,063**	**16**	**161**	**3,975**	**4,224**	**3,044**
Total imports	**6,145**	**5,672**	**197**	**276**	**6,342**	**5,948**	**4,932**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	3–27 1987	3–20* 1987	3–27 1987	3–20* 1987	3–27 1987	3–20* 1987	3–28 1986
Total motor gasoline	226	220	22	19	248	239	310
Leaded gasoline†	10	—	2	—	12	—	5
Unleaded gasoline†	216	220	20	19	236	239	305
Mo. gas. blending comp.	65	45	8	14	73	59	58
Distillate§	244	256	—	8	244	264	136
Residual	384	516	7	5	391	521	560
Jet fuel-naphtha	13	10	—	3	13	13	—
Jet fuel-kerosine	35	18	—	2	35	20	8
LPG	154	197	21	16	175	213	213
Unfinished oils	157	150	3	10	160	160	74
Other	329	330	17	11	346	341	358
Total products	**1,607**	**1,742**	**78**	**88**	**1,685**	**1,830**	**1,717**
Canadian crude	529	592	47	19	576	611	643
Other foreign	2,931	3,119	235	207	3,166	3,326	2,876
Total crude	**3,460**	**3,711**	**282**	**226**	**3,742**	**3,937**	**3,519**
Total imports	**5,067**	**5,453**	**360**	**314**	**5,427**	**5,767**	**5,236**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	4–24 1987	4–17* 1987	4–24 1987	4–17* 1987	4–24 1987	4–17* 1987	4–25 1986
Total motor gasoline	492	89	14	3	506	92	141
Leaded gasoline†	12	—	—	—	12	—	15
Unleaded gasoline†	480	89	14	3	494	92	126
Mo. gas. blending comp.	57	69	9	12	66	81	76
Distillate§	199	215	—	—	199	215	97
Residual	374	533	—	—	374	533	443
Jet fuel-naphtha	10	11	—	—	10	11	92
Jet fuel-kerosine	45	30	—	—	45	30	12
LPG	114	220	18	21	132	241	135
Unfinished oils	93	149	6	—	99	149	116
Other	181	193	—	—	181	193	299
Total products	**1,565**	**1,509**	**47**	**36**	**1,612**	**1,545**	**1,411**
Canadian crude	472	610	7	9	479	619	721
Other foreign	3,240	2,481	213	222	3,453	2,703	3,028
Total crude	**3,712**	**3,091**	**220**	**231**	**3,932**	**3,322**	**3,749**
Total imports	**5,277**	**4,600**	**267**	**267**	**5,544**	**4,867**	**5,160**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	5–22 1987	5–15* 1987	5–22 1987	5–15* 1987	5–22 1987	5–15* 1987	5–23 1986
Total motor gasoline	226	233	15	14	241	247	464
Leaded gasoline†	16	33	—	—	16	33	72
Unleaded gasoline†	210	200	15	14	225	214	392
Mo. gas. blending comp.	49	41	10	10	59	51	56
Distillate§	312	220	—	—	312	220	136
Residual	462	864	11	—	473	864	465
Jet fuel-naphtha	10	11	—	—	10	11	15
Jet fuel-kerosine	19	18	—	—	19	18	62
LPG	113	93	16	15	129	108	234
Unfinished oils	219	222	9	6	228	228	254
Other	141	178	—	36	141	214	154
Total products	**1,551**	**1,880**	**61**	**81**	**1,612**	**1,961**	**1,840**
Canadian crude	510	557	22	22	532	579	573
Other foreign	2,920	3,054	86	111	3,006	3,165	3,454
Total crude	**3,430**	**3,611**	**108**	**133**	**3,538**	**3,744**	**4,027**
Total imports	**4,981**	**5,491**	**169**	**214**	**5,150**	**5,705**	**5,867**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	6–26 1987	6–19* 1987	6–26 1987	6–19* 1987	6–26 1987	6–19* 1987	6–27 1986
Total motor gasoline	408	554	20	5	428	559	294
Leaded gasoline†	71	99	2	2	73	101	13
Unleaded gasoline†	337	455	18	3	355	458	281
Mo. gas. blending comp.	31	64	11	11	42	75	79
Distillate§	483	79	4	2	487	81	134
Residual	443	598	7	8	450	606	945
Jet fuel-naphtha	16	12	—	—	16	12	—
Jet fuel-kerosine	7	57	2	3	9	60	28
LPG	155	94	26	7	181	101	160
Unfinished oils	224	253	5	12	229	265	420
Other	406	401	—	—	406	401	108
Total products	**2,173**	**2,112**	**75**	**48**	**2,248**	**2,160**	**2,168**
Canadian crude	374	519	65	2	439	521	608
Other foreign	4,577	4,747	262	261	4,839	5,008	4,486
Total crude	**4,951**	**5,266**	**327**	**263**	**5,278**	**5,529**	**5,094**
Total imports	**7,124**	**7,378**	**402**	**311**	**7,526**	**7,689**	**7,262**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	7–24 1987	7–17* 1987	7–24 1987	7–17* 1987	7–24 1987	7–17* 1987	7–25 1986
Total motor gasoline	389	387	11	21	400	408	534
Leaded gasoline†	100	80	4	6	104	86	26
Unleaded gasoline†	289	307	7	15	296	322	508
Mo. gas. blending comp.	58	52	—	15	58	67	10
Distillate§	424	265	—	3	424	268	211
Residual	532	953	—	12	532	965	1,004
Jet fuel-naphtha	2	7	—	—	2	7	44
Jet fuel-kerosine	52	25	1	2	53	27	33
LPG	112	190	7	7	119	197	134
Unfinished oils	250	276	3	—	253	276	200
Other	178	121	—	—	178	121	129
Total products	**1,997**	**2,276**	**22**	**60**	**2,019**	**2,336**	**2,299**
Canadian crude	561	593	13	27	574	620	525
Other foreign	4,444	4,001	206	264	4,650	4,265	3,668
Total crude	**5,005**	**4,594**	**219**	**291**	**5,224**	**4,885**	**4,193**
Total imports	**7,002**	**6,870**	**241**	**351**	**7,243**	**7,221**	**6,492**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	8–28 1987	8–21* 1987	8–28 1987	8–21* 1987	8–28 1987	8–21* 1987	8–29 1986
Total motor gasoline	563	245	19	16	582	261	195
Leaded gasoline†	36	8	8	—	44	8	22
Unleaded gasoline†	527	237	11	16	538	253	173
Mo. gas. blending comp.	108	32	21	—	129	32	73
Distillate§	169	177	3	2	172	179	323
Residual	511	666	1	2	512	668	798
Jet fuel-naphtha	—	—	—	—	—	—	—
Jet fuel-kerosine	16	—	—	—	16	—	53
LPG	160	51	5	2	165	53	156
Unfinished oils	317	361	3	—	320	361	159
Other	153	82	—	—	153	82	165
Total products	**1,997**	**1,614**	**52**	**22**	**2,049**	**1,636**	**1,922**
Canadian crude	700	680	7	—	707	680	521
Other foreign	4,092	4,819	42	270	4,134	5,089	4,449
Total crude	**4,792**	**5,499**	**49**	**270**	**4,841**	**5,769**	**4,970**
Total imports	**6,789**	**7,113**	**101**	**292**	**6,890**	**7,405**	**6,892**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	9–25 1987	9–18* 1987	9–25 1987	9–18* 1987	9–25 1987	9–18* 1987	9–26 1986
Total motor gasoline	602	222	11	17	613	239	333
Leaded gasoline†	24	—	2	11	26	11	60
Unleaded gasoline†	578	222	9	6	587	228	273
Mo. gas. blending comp.	40	81	12	14	52	95	65
Distillate§	367	123	5	1	372	124	176
Residual	540	613	8	2	548	615	470
Jet fuel-naphtha	2	2	—	—	2	2	36
Jet fuel-kerosine	37	54	—	2	37	56	76
LPG	184	91	5	4	189	95	161
Unfinished oils	402	205	—	2	402	207	273
Other	264	231	—	—	264	231	366
Total products	**2,438**	**1,622**	**41**	**42**	**2,479**	**1,664**	**1,956**
Canadian crude	671	793	30	—	701	793	478
Other foreign	4,566	3,501	137	114	4,703	3,615	5,137
Total crude	**5,237**	**4,294**	**167**	**114**	**5,404**	**4,408**	**5,615**
Total imports	**7,675**	**5,916**	**208**	**156**	**7,883**	**6,072**	**7,571**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	10–23 1987	10–16* 1987	10–23 1987	10–16* 1987	10–23 1987	10–16* 1987	10–24 1986
Total motor gasoline	359	94	11	10	370	104	297
Leaded gasoline†	28	5	4	3	32	8	35
Unleaded gasoline†	331	89	7	7	338	96	262
Mo. gas. blending comp.	126	20	29	6	155	26	44
Distillate§	319	205	2	4	321	209	228
Residual	451	380	8	5	459	385	988
Jet fuel-naphtha	3	3	—	—	3	3	26
Jet fuel-kerosine	3	3	—	—	3	3	71
LPG	288	245	13	9	301	254	240
Unfinished oils	189	162	12	—	201	162	37
Other	202	189	—	—	202	189	318
Total products	**1,940**	**1,301**	**75**	**34**	**2,015**	**1,335**	**2,249**
Canadian crude	607	679	—	—	607	679	552
Other foreign	3,600	3,658	114	220	3,714	3,878	3,972
Total crude	**4,207**	**4,337**	**114**	**220**	**4,321**	**4,557**	**4,524**
Total imports	**6,147**	**5,638**	**189**	**254**	**6,336**	**5,892**	**6,773**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	11–27 1987	11–20* 1987	11–27 1987	11–20* 1987	11–27 1987	11–20* 1987	11–28 1986
Total motor gasoline	598	429	44	35	642	464	117
Leaded gasoline†	88	42	10	10	98	52	—
Unleaded gasoline†	510	387	34	25	544	412	117
Mo. gas. blending comp.	55	31	26	23	81	54	82
Distillate§	128	161	5	6	133	167	296
Residual	632	432	13	8	645	440	558
Jet fuel-naphtha	30	3	—	—	30	3	8
Jet fuel-kerosine	48	24	2	2	50	26	119
LPG	282	213	7	4	289	217	275
Unfinished oils	157	163	4	2	161	165	100
Other	320	265	1	—	321	265	286
Total products	**2,250**	**1,721**	**102**	**80**	**2,352**	**1,801**	**1,841**
Canadian crude	646	607	1	—	647	607	543
Other foreign	3,897	4,729	241	295	4,138	5,024	2,848
Total crude	**4,543**	**5,336**	**242**	**295**	**4,785**	**5,631**	**3,391**
Total imports	**6,793**	**7,057**	**344**	**375**	**7,137**	**7,432**	**5,232**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

API imports of crude and products

(Thousands of barrels daily)

	Districts 1-4		District 5		Total U.S.		
	12–18 1987	12–11* 1987	12–18 1987	12–11* 1987	12–18 1987	12–11* 1987	12–19 1986
Total motor gasoline	146	493	10	35	156	528	284
Leaded gasoline†	15	74	2	8	17	82	79
Unleaded gasoline†	131	419	8	27	139	446	205
Mo. gas. blending comp.	50	31	19	23	69	54	66
Distillate§	246	133	9	6	255	139	523
Residual	824	439	13	9	837	448	759
Jet fuel-naphtha	3	—	—	—	3	—	8
Jet fuel-kerosine	33	—	5	—	38	—	20
LPG	233	564	5	14	238	578	273
Unfinished oils	197	215	3	3	200	218	100
Other	362	351	—	—	362	351	157
Total products	**2,094**	**2,226**	**64**	**90**	**2,158**	**2,316**	**2,190**
Canadian crude	644	588	11	—	655	588	612
Other foreign	3,716	4,386	131	312	3,847	4,698	3,794
Total crude	**4,360**	**4,974**	**142**	**312**	**4,502**	**5,286**	**4,406**
Total imports	**6,454**	**7,200**	**206**	**402**	**6,660**	**7,602**	**6,596**

*Revised. †Included in total motor gasoline. §Includes No. 4 fuel oil.
Source: American Petroleum Institute
Data available in Oil & Gas Journal Energy Database.

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